APPENDIX B

PHASE I SUMMARY
APPENDIX C
HEALTH & SAFETY PLAN
INVESTIGATION
HEALTH AND SAFETY PLAN

OCTOBER 2015

Prepared For:

NY Developers
1825 65th Street
Brooklyn NY 11204

Prepared By:

Environmental Business
1808 Middle Country Road
Ridge, NY 11961
HEALTH AND SAFETY PLAN

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STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the planned Subsurface Investigation at the Site.

This HASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.
1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the subsurface investigation to be performed to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during subsurface investigation activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this HASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The HASP may be revised by EBC at the request of the client and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC’s project manager, site safety officer and/or the EBC health and safety consultant.

1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and/or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.
Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

1.2 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in Appendix A.

Site conditions may warrant an amendment to the HASP. Amendments to the HASP are acknowledged by completing forms included in Appendix B.

1.3 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Address</th>
<th>Contact Numbers</th>
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<tbody>
<tr>
<td>Mrs. Chawinie Reilly</td>
<td>EBC Project Manager</td>
<td>1808 Middle Country Road</td>
<td>(631) 504-6000</td>
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<tr>
<td></td>
<td></td>
<td>Ridge, NY 11961</td>
<td>(631) 827-5007</td>
</tr>
<tr>
<td>Mr. Kevin Waters</td>
<td>Site Safety Officer</td>
<td>1808 Middle Country Road</td>
<td>(631) 504-6000</td>
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<tr>
<td></td>
<td></td>
<td>Ridge, NY 11961</td>
<td>(516) 287-9023</td>
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The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this HASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this HASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and
implementing the air quality monitoring program specified in this HASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.

6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.
2.0 SITE BACKGROUND AND SCOPE OF WORK

A Remedial Investigation is being conducted at the site to identify and characterize potential contaminants within the surface/subsurface soils, groundwater and soil gas at the site.

The results from this investigation will help determine what actions may be required, if any, to prevent exposure to contaminants from the change in use of the site. The work will be conducted in accordance with the procedures as required by the Environmental Review Process as administered by the New York City Department of Environmental Protection (DEP).

2.1 Remedial Investigation Scope

The subsurface investigation will include the installation of soil borings, groundwater wells and/or soil vapor implants. Site sampling locations are shown on Figures 3-4 of the Investigation Work Plan.

Soil borings will be advanced with Geoprobe direct push equipment and sampled with a 4 or 5 foot macro core sampler using disposable acetate liners. Soil will be characterized by a hydrogeologist or environmental technician and field screened for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID). Retained samples from each boring will be submitted to a New York State Department of Health ELAP-certified laboratory for analysis.

The groundwater samples will be collected by installing a temporary monitoring well approximately 5 feet below the water table. Soil gas samples will be collected through the installation of soil vapor probes to a depth of 6 ft.
3.0 SITE HAZARD EVALUATION

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

This HASP has been developed for work performed at the site in association with a Phase II subsurface investigation. The primary hazards to the field crew will be physical hazards related to sample collection procedures and equipment, and chemical exposures to the sampling crew from exposure to potential contaminants which may be present at the site.

3.1 Physical Hazards

3.1.1 Tripping Hazards
An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Cuts and Lacerations
Field activities that involve drilling and boring equipment may result in cuts or lacerations from machinery and tools used in collecting samples, cutting disposable tubing and opening acetate sleeves and liners. A first aid kit approved by the American Red Cross will be available during all subsurface investigative activities.

3.1.3 Lifting Hazards
Improper lifting by workers is one of the leading causes of industrial injuries. Field workers and drillers may be required to lift heavy objects such as drilling tools, buckets of decontamination water, cement, etc. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.4 Utility Hazards
Before conducting any subsurface boring or sampling, the drilling contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.5 Traffic Hazards
All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The drilling contractor shall carry on his operations without undue interference or delays to traffic. The drilling contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.
3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
   a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
   b. Work in Pairs. Individuals should avoid undertaking any activity alone.
   c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
   d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
   a. Heat Rash (or prickly heat):
      Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
      Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
      Treatment: Remove source or irritation and cool skin with water or wet cloths.
   b. Heat Cramps (or heat prostration)
      Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
      Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.
      Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.
   c. Heat Stroke
      Cause: Same as heat exhaustion. This is also an extremely serious condition.
Symptoms: Dry and hot skin, dry mouth, dizziness, nausea, headache and rapid pulse.
Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

3.2.2 Cold Exposure
Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

3.3 Chemical Hazards
There is no documented contamination at the Site, however, urban fill, present throughout the New York City area, typically contains elevated levels of semi-volatile organic compounds and metals. These "contaminants" are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash bits or tar and asphalt.

Based on the long history of use of the property for residential, and the inherent properties of urban fill, the following compounds are considered for the site as potential contaminants: semi-volatile organic compounds (SVOCs) related to minor petroleum fuel spills and / or inherent in historic fill, pesticides related to historic use of the site, and heavy metals such as arsenic, chromium, lead and mercury related to historic fill materials.

In addition to the expected fill material, the property was also used for a time by Vartex Instrument Corp., which was known to use chlorinated solvents including trichloroethylene. Therefore chlorinated solvents are also concern at this site.

The primary routes of exposure to these contaminants are inhalation, ingestion and absorption. Appendix C includes information sheets for suspected chemicals that may be encountered at the site.

3.3.1 Respirable Dust and Direct Contact with Soil and Groundwater
Dust may be generated from drilling activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than the OSHA action level of 100 \( \mu g/m^3 \) over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soil and groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.
3.3.2 Organic Vapors
Considering the past and present use of the properties, VOCs may be encountered at the site in soil and/or groundwater. Therefore, soil boring activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during drilling activities to determine whether organic vapor concentrations exceed action levels shown below.

<table>
<thead>
<tr>
<th>PID Response</th>
<th>Action</th>
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<tr>
<td>Sustained readings of 5 ppm or greater</td>
<td>Shut down equipment and allow area to vent. Resume when readings return to background</td>
</tr>
<tr>
<td>Sustained readings of 5 ppm or greater that do not subside after venting</td>
<td>Implement Vapor Release Plan (Section 6.8). Re-evaluate respiratory protection as upgrade may be required.</td>
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4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work uniform, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- high visibility safety vest;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when the concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), but are less than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- high visibility safety vest;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.
The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade (i.e. dust above 5,000 µg/m³ or sustained VOCs above 5 ppm in the breathing zone) the level of protection engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.
5.0 SITE CONTROL

5.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book. It is expected that for soil boring and sampling activities, identification of an exclusion zone, decontamination zone, and support zone will not be necessary.

Tasks requiring OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training are carried out in the exclusion zone. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.
6.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

6.1 Emergency Equipment On-site

Private telephones: Site personnel.
Two-way radios: Site personnel where necessary.
Emergency Alarms: On-site vehicle horns*.
First aid kits: On-site, in vehicles or office.
Fire extinguisher: On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

6.2 Emergency Telephone Numbers

| General Emergencies | 911          |
| New York City Police | 911          |
| Lincoln Medical and Mental Health Center | 1-718-579-5016 |
| NYSDEC Spills Division | 1-800-457-7362 |
| NYSDEC Division of Env. Remediation | 1-718-482-4900 |
| NYCDEP | 1-718-699-9811 |
| NYC Department of Health | 1-212-788-4711 |
| NYC Fire Department | 911          |
| National Response Center | 1-800-424-8802 |
| Poison Control | 1-212-340-4494 |
| Site Safety Officer | 1-631-504-6000 |
| Alternate Site Safety Officer | 1-631-504-6000 |

6.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager’s on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;
• Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

• Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

• Determine the cause of incidents and make recommendations to prevent recurrence; and,

• Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

• Project Manager  Mrs. Chawinie Reilly (631) 504-6000
• Site Safety Officer  Mr. Kevin Waters (631) 504-6000

6.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (Appendix D) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (Appendix D) and information on the chemical(s) to which they may have been exposed (Appendix C).

6.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

• use fire fighting equipment available on site; or,
• remove or isolate flammable or other hazardous materials that may contribute to the fire.

6.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.
Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

### 6.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

### 6.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If
two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.

- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.
APPENDIX A

SITE SAFETY ACKNOWLEDGEMENT FORM
DAILY BRIEFING SIGN-IN SHEET

Date: __________________________    Person Conducting Briefing: __________________________

Project Name and Location: ___________________________________________________________

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc...):

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

2. OTHER ISSUES (HASP changes, attendee comments, etc...):

________________________________________________________________________________

________________________________________________________________________________

3. ATTENDEES (Print Name):

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(Company Logo and Contact Information)
APPENDIX B

SITE SAFETY PLAN AMENDMENTS
### SITE SAFETY PLAN AMENDMENT FORM

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<thead>
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<th>Site Safety Plan Amendment #:</th>
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<td>Site Name:</td>
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**Alternative Procedures:**

- [ ] 
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**Required Changes in PPE:**

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- [ ]

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**Project Superintendent (signature):** ___________________________  **Date:** ____________

---

**Health and Safety Consultant (signature):** ___________________________  **Date:** ____________
Site Safety Officer (signature)  Date
APPENDIX C

CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.
ICSC: 1486

1,1,1,2-TETRACHLOROETHANE

ICSC #  1486  
CAS #   630-20-6  
RTECS #  KI84500000  
UN #   1702  
April 23, 2004 Validated

**TYPES OF HAZARD/EXPOSURE** | **ACUTE HAZARDS/SYMPTOMS** | **PREVENTION** | **FIRST AID/FIRE FIGHTING**
--- | --- | --- | ---
**FIRE**  
Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.  
NO contact with hot surfaces. NO open flames.  
In case of fire in the surroundings: powder, water spray, foam, carbon dioxide.

**EXPLOSION**

**EXPOSURE**

**INHALATION**  
Ventilation, local exhaust, or breathing protection.  
Fresh air, rest.

**SKIN**

Protective gloves.  
Remove contaminated clothes. Rinse and then wash skin with water and soap.

**EYES**

Redness. Pain.  
Safety goggles, or eye protection in combination with breathing protection.  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**INGESTION**

Do not eat, drink, or smoke during work.  
Do NOT induce vomiting. Refer for medical attention. Give plenty of water to drink.

**SPILLAGE DISPOSAL**

Collect leaking liquid in covered containers. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.

**STORAGE**

Separated from strong oxidants, strong bases. Well closed.

**PACKAGING & LABELLING**

Do not transport with food and feedstuffs.  
UN Hazard Class: 6.1  
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

1,1,1,2-TETRACHLOROETHANE

ICSC: 1486

http://www.cdc.gov/niosh/ipcsneng/neng1486.html  
11/29/2011
**PHYSICAL STATE; APPEARANCE:**
YELLOW TO RED LIQUID.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on heating producing toxic and corrosive gases including hydrogen chloride. Reacts with strong bases and strong oxidants.

**PHYSICAL PROPERTIES**
- Boiling point: 130.5°C
- Melting point: -70.2°C
- Relative density (water = 1): 1.54
- Solubility in water, g/100 ml at 25°C: 0.11
- Vapour pressure, kPa at 25°C: 1.9
- Octanol/water partition coefficient as log Pow: 2.66

**ENVIRONMENTAL DATA**
The substance is harmful to aquatic organisms.

**NOTES**
See ICSC 0332 1,1,2,2,-Tetrachloroethane.

**ADDITIONAL INFORMATION**
Transport Emergency Card: TEC (R)-61GT1-II

**ICSC: 1486**

(C) IPCS, CEC, 1994

1,1,2-TETRACHLOROETHANE

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# International Chemical Safety Cards

## 1,1,1-TRICHLOROETHANE

Methyl chloroform  
Methyltrichloromethane  
alpha-Trichloroethane  
C$_2$H$_3$Cl$_3$ / CCl$_3$CH$_3$  
Molecular mass: 133.4

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0079</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>71-55-6</td>
</tr>
<tr>
<td>RTECS #</td>
<td>KJ2975000</td>
</tr>
<tr>
<td>UN #</td>
<td>2831</td>
</tr>
<tr>
<td>EC #</td>
<td>602-013-00-2</td>
</tr>
</tbody>
</table>

April 19, 2007 Validated

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire. See Notes.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

## EXPOSURE

| **SKIN** | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| **EYES** | Redness. Pain. | Safety goggles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

## SPILLAGE DISPOSAL

Personal protection: self-contained breathing apparatus. Ventilation. Collect leaking and spilled liquid in sealable, suitable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.

## STORAGE

Separated from food and feedstuffs and strong oxidants, aluminium, manganese and zinc. Cool. Dry. Store in an area without drain or sewer access.

## PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Note: F  
Xn symbol  
N symbol  
R: 20-59  
S: 2-24/25-59-61  
UN Hazard Class: 6.1  
UN Packing Group: III  
Signal: Warning

[http://www.cdc.gov/niosh/ipcsneng/neng0079.html](http://www.cdc.gov/niosh/ipcsneng/neng0079.html)
### INTERNATIONAL CHEMICAL SAFETY CARDS

**1,1,1-TRICHLOROETHANE**

**ICSC: 0079**

<table>
<thead>
<tr>
<th>PHYSICAL STATE: APPEARANCE:</th>
<th>COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>The vapour is heavier than air.</td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>The substance decomposes on burning, producing toxic and corrosive fumes. Reacts violently with aluminium and its alloys with magnesium, bases, strong oxidants, acetone, and zinc.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV: 350 ppm as TWA, 450 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued (ACGIH 2006).</td>
</tr>
<tr>
<td></td>
<td>MAK: 200 ppm, 1100 mg/m³; Peak limitation category: II(1); skin absorption (H); Pregnancy risk group: C; (DFG 2006).</td>
</tr>
<tr>
<td></td>
<td>OSHA PEL: TWA 350 ppm (1900 mg/m³)</td>
</tr>
<tr>
<td></td>
<td>NIOSH REL: C 350 ppm (1900 mg/m³) 15-minute See Appendix C (Chloroethanes)</td>
</tr>
<tr>
<td></td>
<td>NIOSH IDLH: 700 ppm See: 71556</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 74°C
- Melting point: -30°C
- Relative density (water = 1): 1.34
- Solubility in water: (poor)
- Vapour pressure, kPa at 20°C: 13.3
- Relative vapour density (air = 1): 4.6
- Flash point: see Notes
- Auto-ignition temperature: 537°C
- Explosive limits, vol% in air: 8-16
- Octanol/water partition coefficient as log Pow: 2.49

**ENVIRONMENTAL DATA**

The substance is harmful to aquatic organisms.

**NOTES**

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. The substance burns only in excess oxygen or if a strong source of ignition is present. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-61S2831 or 61GTI-III

NFPA Code: H2; F1; R0

[See Important Information on Back]

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
ICSC: 0079  

**ADDITIONAL INFORMATION**

<table>
<thead>
<tr>
<th>ICSC: 0079</th>
<th>1,1,1-TRICHLOROETHANE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(C) IPCS, CEC, 1994</td>
</tr>
</tbody>
</table>

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## 1,1,2,2-TETRACHLOROETHANE

**International Chemical Safety Cards**

### ACUTE HAZARDS/SYMPTOMS

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td><strong>FIRE</strong></td>
</tr>
<tr>
<td>EXPLOSION</td>
<td><strong>EXPLOSION</strong></td>
<td><strong>EXPLOSION</strong></td>
<td><strong>EXPLOSION</strong></td>
</tr>
<tr>
<td>SKIN</td>
<td>MAY BE ABSORBED! Redness. Dry skin. (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>Abdominal pain. Nausea. Vomiting. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Rest. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

### STORAGE


### PACKAGING & LABELLING


SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

http://www.cdc.gov/niosh/ipcsneng/neng0332.html

11/29/2011
# International Chemical Safety Cards

## 1,1,2,2-TETRACHLOROETHANE

### PHYSICAL STATE; APPEARANCE:

COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:

The vapour is heavier than air.

### CHEMICAL DANGERS:

The substance decomposes on heating and under influence of air, UV light and moisture producing toxic and corrosive gases including hydrogen chloride, phosgene. Reacts violently with alkali metals, strong bases and powdered metals producing toxic and corrosive gases. Attacks plastic and rubber.

### OCCUPATIONAL EXPOSURE LIMITS:

- **TLV:** 1 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2005).
- **MAK:** 1 ppm, 7.0 mg/m³
- **Peak limitation category:** II(2);
- **skin absorption (H):**
- **Carcinogen category:** 3B; Pregnancy risk group: D; (DFG 2006).
- **OSHA PEL:** TWA 5 ppm (35 mg/m³) skin
- **NIOSH REL:** Ca TWA 1 ppm (7 mg/m³) skin See Appendix A See Appendix C (Chloroethanes)
- **NIOSH IDLH:** Ca 100 ppm See: 79345

### PHYSICAL PROPERTIES

- **Boiling point:** 146°C
- **Melting point:** -44°C
- **Relative density (water = 1):** 1.59
- **Solubility in water, g/100 ml at 20°C:** 0.29

### ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms.

### ROUTES OF EXPOSURE:

The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

### INHALATION RISK:

A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:

The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system, liver and kidneys, resulting in central nervous system depression and impaired functions. Exposure may result in unconsciousness. Exposure may result in death.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

The liquid defats the skin. The substance may have effects on the central nervous system and liver, resulting in impaired functions.

### NOTES

Use of alcoholic beverages enhances the harmful effect. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in October 2005. See section Storage.

Transport Emergency Card: TEC (R)-61S1702 or 61GT1-II

Card has been partially updated in July 2007: see Occupational Exposure Limits.

### ADDITIONAL INFORMATION

**ICSC: 0332**

(C) IPCS, CEC, 1994

**1,1,2,2-TETRACHLOROETHANE**

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http://www.cdc.gov/niosh/ipcsneng/neng0332.html
# International Chemical Safety Cards

## 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

**ICSC:** 0050

[ICSC: 0050](http://www.cdc.gov/niosh/ipcsneng/neng0050.html)

---

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

### EXPOSURE

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Precautions</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cardiac arrhythmia. Confusion. Drowsiness. Unconsciousness.</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td></td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus.

### STORAGExx

Separated from metals and alloys. See Chemical Dangers. Cool. Ventilation along the floor.

### PACKAGING & LABELLING

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE**

**ICSC: 0050**

### PHYSICAL STATE; APPEARANCE:
COLOURLESS VOLATILE LIQUID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:
The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

### CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carbonyl fluoride ICSC 0633). Reacts violently with powdered metals causing fire and explosion hazard. Attacks magnesium and its alloys.

### OCCUPATIONAL EXPOSURE LIMITS:
- TLV: 1000 ppm as TWA; 1250 ppm as STEL; A4 (not classifiable as a human carcinogen); (ACGIH 2004).
- MAK: 500 ppm, 3900 mg/m³;
- Peak limitation category: II(2); Pregnancy risk group: D; (DFG 2006).
- OSHA PEL: TWA 1000 ppm (7600 mg/m³)
- NIOSH REL: TWA 1000 ppm (7600 mg/m³) ST 1250 ppm (9500 mg/m³)
- NIOSH IDLH: 2000 ppm See: 76131

### PHYSICAL PROPERTIES
- Boiling point: 48°C
- Melting point: -36°C
- Relative density (water = 1): 1.56
- Solubility in water, g/100 ml at 20°C: 0.02
- Vapour pressure, kPa at 20°C: 36
- Relative vapour density (air = 1): 6.5
- Relative density of the vapour/air-mixture at 20°C (air = 1): 3.0
- Auto-ignition temperature: 680°C
- Octanol/water partition coefficient as log Pow: 3.30

### ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

### NOTES
High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Freon 113, Frigen 113, Halon 113 are trade names.

Card has been partially updated in July 2007: see Occupational Exposure Limits.

### ADDITIONAL INFORMATION

**ICSC: 0050**

1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**
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# International Chemical Safety Cards

## 1,1,2-TRICHLOROETHANE

**ICSC:** 0080

- **Vinyl trichloride**
- **beta-Trichloroethane**
- **C$_2$H$_3$Cl$_3$ / CHCl$_2$CH$_2$Cl**
- Molecular mass: 133.4

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPOTMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions. Heating will cause rise in pressure with risk of bursting. See Notes.</td>
<td>NO open flames. NO contact with hot surfaces.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>See Notes.</td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td>PREVENT GENERATION OF MISTS!</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>MAY BE ABSORBED! Dry skin.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td></td>
<td>Safety spectacles or face shield.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>(Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus.

### STORAGE
Provision to contain effluent from fire extinguishing. Separated from strong oxidants, strong bases, many metals. Well closed. Ventilation along the floor.

### PACKAGING & LABELLING
- Marine pollutant.
- Xn symbol
- R: 20/21/22-40-66
- S: 2-9-36/37-46
- UN Hazard Class: 9
- UN Packing Group: III

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SEE IMPORTANT INFORMATION ON BACK

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ICSC: 0080

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

**International Chemical Safety Cards**

**1,1,2-TRICHLOROETHANE**

**ICSC: 0080**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming hydrogen chloride (see ICSC0163), phosgene (see ICSC0007), and other toxic gases. Reacts with strong oxidants, strong bases and metals such as sodium, potassium, magnesium and powdered aluminium. Attacks many plastic, rubber, steel and zinc.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: 10 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
- MAK: 10 ppm, 55 mg/m³
- Peak limitation category: II(2);
- Skin absorption (H);
- Carcinogen category: 3B; (DFG 2004).
- OSHA PEL: TWA 10 ppm (45 mg/m³) skin
- NIOSH REL: Ca TWA 10 ppm (45 mg/m³) skin See Appendix A See Appendix C (Chloroethanes)
- NIOSH IDLH: Ca 100 ppm See: 79005

**PHYSICAL PROPERTIES**
- Boiling point: 114°C
- Melting point: -36°C
- Relative density (water = 1): 1.44
- Solubility in water: none
- Vapour pressure, kPa at 20°C: 2.5
- Relative vapour density (air = 1): 4.6
- Relative density of the vapour/air-mixture at 20°C (air = 1): 4.6
- Explosive limits, vol% in air: 6-15.5
- Octanol/water partition coefficient as log Pow: 2.35

**ENVIRONMENTAL DATA**
The substance is harmful to aquatic organisms.

**NOTES**
Flash point unknown in literature. Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. The relation between odour and the occupational exposure limit cannot be indicated. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, EU classification.

Transport Emergency Card: TEC (R)-90GM6-III
NFPA Code: H 3; F 1; R 0;

**ADDITIONAL INFORMATION**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Group.

ICSC: NENG0080 International Chemical Safety Cards (WHO/IPCS/ ILO) | CDC/NIOSH

http://www.cdc.gov/niosh/ipcsneng/neng0080.html

11/29/2011
| IMPORTANT LEGAL NOTICE: | Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |
# 1,1-DICHLOROETHANE

**Ethane, 1,1-dichloro-Ethylidene chloride**  
\( \text{CH}_3\text{CHCl}_2 \)  
Molecular mass: 99.0

**ICSC #** 0249  
**CAS #** 75-34-3  
**RTECS #** K10175000  
**UN #** 2362  
**EC #** 602-011-00-1  
September 20, 1993 Validated

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
</tbody>
</table>

| EXPLOSION | Vapour/air mixtures are explosive. | Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. | In case of fire: keep drums, etc., cool by spraying with water. |

## EXPOSURE

### INHALATION  
Ventilation, local exhaust, or breathing protection.  
Fresh air, rest. Refer for medical attention.

### SKIN  
Dry skin. Roughness.  
Protective gloves  
Remove contaminated clothes. Rinse skin with plenty of water or shower.

### EYES  
Redness. Pain.  
Safety spectacles.  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

### INGESTION  
Burning sensation. (Further see Inhalation).  
Do not eat, drink, or smoke during work.  
Rinse mouth. Refer for medical attention.

## SPILLAGE DISPOSAL


## STORAGE

Fireproof. Separated from: see Chemical Dangers. Cool.

## PACKAGING & LABELLING

Marine pollutant.  
F symbol  
Xn symbol  
R: 11-22-36/37-52/53  
S: 2-16-23-61  
UN Hazard Class: 3  
UN Packing Group: II

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1,1-DICHLOROETHANE

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air and may travel along the ground; distant ignition possible.

**CHEMICAL DANGERS:**
The substance decomposes on heating and on burning producing toxic and corrosive fumes including phosgene (see ICSC 0007) and hydrogen chloride (see ICSC 0163). Reacts violently with strong oxidants, alkali metals and earth-alkali metals, powdered metals, causing fire and explosion hazard. Attacks aluminium, iron and polyethylene. Contact with strong caustic will cause formation of flammable and toxic acetaldehyde gas.

**OCCUPATIONAL EXPOSURE LIMITS:**

<table>
<thead>
<tr>
<th>TLV</th>
<th>MAK</th>
<th>OSHA PEL</th>
<th>NIOSH REL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2004).</td>
<td>100 ppm, 410 mg/m³; Peak limitation category: II(2); Pregnancy risk group: C; (DFG 2006).</td>
<td>TWA 100 ppm (400 mg/m³)</td>
<td>TWA 100 ppm (400 mg/m³)</td>
<td>3000 ppm</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 57°C
- Melting point: -98°C
- Relative density (water = 1): 1.2
- Solubility in water, g/100 ml at 20°C: 0.6
- Vapour pressure, kPa at 20°C: 24
- Relative vapour density (air = 1): 3.4
- Flash point: -6°C c.c.
- Auto-ignition temperature: 458°C
- Explosive limits, vol% in air: 5.6-11.4
- Octanol/water partition coefficient as log Pow: 1.8

**ENVIRONMENTAL DATA**

Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in October 2005: see sections Occupational Exposure Limits, EU classification, Emergency Response. Card has been partly updated in October 2006: see sections Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-30GF1-I+II

NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

**ICSC: 0249**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## VINYLIDENE CHLORIDE

1,1-Dichloroethene  
1,1-Dichloroethylene  
VDC  
\( C_2H_2Cl_2 / H_2C=CCl_2 \)

| Molecular mass: 97 |

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0083</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>75-35-4</td>
</tr>
<tr>
<td>RTECS #</td>
<td>KV9275000</td>
</tr>
<tr>
<td>UN #</td>
<td>1303 (stabilized)</td>
</tr>
<tr>
<td>EC #</td>
<td>602-025-00-8</td>
</tr>
</tbody>
</table>

### April 13, 2000 Validated

## TYPES OF HAZARD/EXPOSURE

### FIRE

**Exposure:**  
Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.

**Prevention:**  
NO open flames, NO sparks, and NO smoking.

**First Aid/Fire Fighting:**  
Powder, water spray, foam, carbon dioxide.

### EXPLOSION

**Exposure:**  
Vapour/air mixtures are explosive.

**Prevention:**  
Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.

**First Aid/Fire Fighting:**  
In case of fire: keep drums, etc., cool by spraying with water.

### EXPOSURE

**Inhalation:**  
Dizziness. Drowsiness. Unconsciousness.

**Prevention:**  
Ventilation, local exhaust, or breathing protection.

**First Aid/Fire Fighting:**  
Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.

**Skin:**  
Redness. Pain.

**Prevention:**  
Protective gloves. Protective clothing.

**First Aid/Fire Fighting:**  
Remove contaminated clothes. Rinse and then wash skin with water and soap.

**Eyes:**  
Redness. Pain.

**Prevention:**  
Safety goggles, or eye protection in combination with breathing protection.

**First Aid/Fire Fighting:**  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**Ingestion:**  
Abdominal pain. Sore throat. (Further see Inhalation).

**Prevention:**  
Do not eat, drink, or smoke during work.

**First Aid/Fire Fighting:**  
Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

## SPILLAGE DISPOSAL

Evacuate danger area! Consult an expert! Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

## STORAGE

Fireproof. Provision to contain effluent from fire extinguishing. Separated from incompatible materials (see Chemical Dangers). Cool. Keep in the dark. Store only if stabilized.

## PACKAGING & LABELLING

Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container.

Marine pollutant.

Note: D  
F+ symbol  
Xn symbol  
R: 12-20-40  
S: 2-7-16-36/37-46  
UN Hazard Class: 3  
UN Packing Group: I

---

http://www.cdc.gov/niosh/ipcsnen/neng0083.html  
12/7/2011
International Chemical Safety Cards

VINYLIDENE CHLORIDE

PHYSICAL STATE; APPEARANCE:
VOLATILE COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible. Vinylidene chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.

CHEMICAL DANGERS:
The substance can readily form explosive peroxides. The substance will polymerize readily due to heating or under the influence of oxygen, sunlight, copper or aluminium, with fire or explosion hazard. May explode on heating or on contact with flames. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride, phosgene). Reacts violently with oxidants.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 5 ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2004).
MAK: 2 ppm, 8.0 mg/m³; Peak limitation category: II(2); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).
OSHA PEL*: none
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca N.D. See: IDLH INDEX

PHYSICAL PROPERTIES
Boiling point: 32°C
Melting point: -122°C
Relative density (water = 1): 1.2
Solubility in water, g/100 ml at 25°C: 0.25
Vapour pressure, kPa at 20°C: 66.5
Relative vapour density (air = 1): 3.3

ENVIRONMENTAL DATA
The substance is harmful to aquatic organisms.

NOTES
Depending on the degree of exposure, periodic medical examination is suggested. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated October 2004 and in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-30S1303
NFPA Code: H2; F4; R2;

http://www.cdc.gov/niosh/ipcsneng/neng0083.html
### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>ICSC: 0083</th>
<th>VINYLIDENE CHLORIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
</tr>
</tbody>
</table>

**IMPORTANT LEGAL NOTICE:**

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Product ID:F824 1,1-DICHLOROPROPENE
MSDS Date:09/30/1992
FSC:6550
NIIN:00F037539
MSDS Number: BWJHM

=== Responsible Party ===
Company Name: CHEM SERVICE INC
Address: 660 TOWER LN
Box: 3108
City: WEST CHESTER
State: PA
ZIP: 19381-3108
Country: US
Info Phone Num: 215-692-3026/800-452-9994
Emergency Phone Num: 215-692-3026/800-452-9994
CAGE: 84898

=== Contractor Identification ===
Company Name: CHEM SERVICE INC
Box: 3108
City: WEST CHESTER
State: PA
ZIP: 19381
Country: US
Phone: 215-692-3026
CAGE: 84898

Company Name: CHEM SERVICE, INC
Address: 660 TOWER LN
Box: 599
City: WEST CHESTER
State: PA
ZIP: 19301-9650
Country: US
Phone: 610-692-3026
CAGE: 8Y898

Composition/Information on Ingredients
Ingred Name: 1,1-DICHLOROPROPYLENE
CAS: 563-58-6
RTECS #: UC8290000

Hazards Identification
Routes of Entry: Inhalation: YES  Skin: YES  Ingestion: YES
Reports of Carcinogenicity: NTP: NO  IARC: NO  OSHA: NO
Health Hazards Acute and Chronic: LACHRYMATOR-EYES: SEVERE
IRRITATION/SEVERE BURNS. SKIN: HARMFUL IF ABSORBED, BURNS.
INHALATION: HARMFUL/FATAL. EXTREMELY DESTRUCTIVE OF MUCOUS
MEMBRANES & UPPER RESPIRATORY TRACT. CAN CAUSE EDEMA. INGESTION:
HARMFUL.
Explanation of Carcinogenicity: NONE
Effects of Overexposure: IRRITATION, BURNS, SWELLING, BURNING SENSATION,
COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE,
NAUSEA, VOMITING.

First Aid Measures
First Aid:EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH
W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER TO
CLEANSE. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED
& CONTINUE UNTIL MEDICAL ASSISTANCE ARRIVES. OBTAIN MEDICAL
ATTENTION IN ALL CASES.
Fire Fighting Measures

Flash Point: 32F
Extinguishing Media: CO2, DRY CHEMICAL POWDER/SPRAY.
Unusual Fire/Explosion Hazard: FLAMMABLE CHEMICAL.

Accidental Release Measures

Spill Release Procedures: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Handling and Storage

Handling and Storage Precautions: STORE IN A COOL DRY PLACE ONLY W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. FOR LABORATORY USE ONLY.
Other Precautions: AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATHE VAPORS. CONTACT LENSES SHOULDN'T BE WORN IN THE LABORATORY. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL CONTACT.

Exposure Controls/Personal Protection

Respiratory Protection: WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Eye Protection: EYE SHIELDS

Physical/Chemical Properties

Appearance and Odor: CRYSSTALLINE SOLID

Stability and Reactivity Data

Stability Indicator/Materials to Avoid: YES
STRONG OXIDIZING AGENTS/ACIDS.
Hazardous Decomposition Products: TOXIC FUMES. DECOMPOSITION PRODUCTS ARE CORROSIVE.

Disposal Considerations

Waste Disposal Methods: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.

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# International Chemical Safety Cards

## 1,2,3-TRICHLOROBENZENE

ICSC: 1222

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Dry powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th></th>
<th>PREVENT DISPERSION OF DUST!</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>INHALATION</td>
<td>Cough. Sore throat.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>SKIN</td>
<td></td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)

### STORAGE
Separated from strong oxidants. Keep in a well-ventilated room.

### PACKAGING & LABELLING
UN Hazard Class: 9

---

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL STATE; APPEARANCE:**
WHITE CRYSTALS, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic and corrosive fumes including hydrogen chloride. Reacts with strong oxidants.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.
MAK: 5 ppm, 38 mg/m³; H;
Peak limitation category: II(2); Pregnancy risk group: D;
(DFG 2003).

**PHYSICAL PROPERTIES**
Boiling point: 218.5°C
Melting point: 53.5°C
Density: 1.45 g/cm³
Solubility in water: very poor

**REPORTED VAPOUR PRESSURE AND RELATIVE DENSITY**
Vapour pressure, Pa at 25°C: 17.3
Relative vapour density (air = 1): 6.26
Flash point: 112.7°C c.c.
Octanol/water partition coefficient as log Pow: 4.05

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

**NOTES**
UN number 2321 refers to liquid trichlorobenzenes. Liquid trichlorobenzenes are marine pollutants. See ICSC 1049 1,2,4-Trichlorobenzene and 0344 1,3,5-Trichlorobenzene.

Transport Emergency Card: TEC (R)-90GM7-III

**ADDITIONAL INFORMATION**

**ICSC: 1222**
1,2,3-TRICHLOROBENZENE
(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## 1,2,3-TRICHLOROPROPANE

### ICSC: 0683

**Glycerol trichlorohydrin**  
**Allyl trichloride**  
C₃H₅Cl₃ / CH₂ClCHClCH₂Cl  
Molecular mass: 147.4

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0683</th>
</tr>
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<tbody>
<tr>
<td>CAS #</td>
<td>96-18-4</td>
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<tr>
<td>RTECS #</td>
<td>T9275000</td>
</tr>
<tr>
<td>UN #</td>
<td>2810</td>
</tr>
<tr>
<td>EC #</td>
<td>602-062-00-X</td>
</tr>
<tr>
<td>April 21, 2005 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>FIRE</th>
<th>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</th>
<th>NO open flames.</th>
<th>Powder, alcohol-resistant foam, water spray, carbon dioxide.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLOSION</td>
<td>Above 73°C explosive vapour/air mixtures may be formed. Risk of fire and explosion on contact with metals.</td>
<td>Above 73°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

### Exposure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Safety spectacles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### Spillage Disposal

- Personal protection: filter respirator for organic gases and vapours. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.

### Storage

- Separated from powdered metals, food and feedstuffs. Cool. Keep in a well-ventilated room. Store in an area without drain or sewer access.

### Packaging & Labelling

- Do not transport with food and feedstuffs. Marine pollutant.
- Note: D  
- T symbol  
- R: 45-60-20/21/22  
- S: 53-45  
- UN Hazard Class: 6.1  
- UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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http://www.cdc.gov/niosh/ipcsneng/neng0683.html  
11/29/2011
### PHYSICAL STATE; APPEARANCE:
- COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:
- The vapour is heavier than air.

### CHEMICAL DANGERS:
- The substance decomposes on burning producing toxic and corrosive fumes. Reacts violently with some powdered metals causing explosion hazard.

### OCCUPATIONAL EXPOSURE LIMITS:
- TLV: 10 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2005).
- MAK: skin absorption (H);
- Carcinogen category: 2; (DFG 2005).
- OSHA PEL: TWA 50 ppm (300 mg/m³)
- NIOSH REL: Ca TWA 10 ppm (60 mg/m³) skin
- NIOSH IDLH: Ca 100 ppm See 96184

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

### INHALATION RISK:
- A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the liver and kidneys, resulting in impaired functions. Exposure at high levels may result in lowering of consciousness.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is probably carcinogenic to humans.

### PHYSICAL PROPERTIES
- Boiling point: 156°C
- Melting point: -14°C
- Relative density (water = 1): 1.39
- Solubility in water, g/100 ml: 0.18 (very poor)
- Vapour pressure, kPa at 20°C: 0.29
- Relative vapour density (air = 1): 5.1
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
- Flash point: 73°C c.c.
- Auto-ignition temperature: 304°C
- Explosive limits, vol% in air: 3.2-12.6
- Octanol/water partition coefficient as log Pow: 2.27

### ENVIRONMENTAL DATA
The substance is harmful to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to ground water contamination.

### NOTES
Do NOT take working clothes home. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61GT1-III

NFPA Code: H3; F2; R0;

### ADDITIONAL INFORMATION

ICSC: 0683

(C) IPCS, CEC, 1994

1,2,3-TRICHLOROPROPAINE

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# International Chemical Safety Cards

## 1,2,4-TRICHLOROBENZENE

![Chemical Logo]

**1,2,4-Trichlorobenzol**  
unsym-Trichlorobenzene  
C₆H₃Cl₃  
Molecular mass: 181.5

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>1049</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>120-82-1</td>
</tr>
<tr>
<td>RTECS #</td>
<td>DC2100000</td>
</tr>
<tr>
<td>UN #</td>
<td>2321</td>
</tr>
<tr>
<td>EC #</td>
<td>602-087-00-6</td>
</tr>
</tbody>
</table>

November 26, 2003 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough. Sore throat. Burning sensation.</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redness. Pain.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Sweep spilled substance into sealable containers, if solid. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

### STORAGE

Separated from strong oxidants, acids, food and feedstuffs.

### PACKAGING & LABELLING

- Do not transport with food and feedstuffs.  
- Marine pollutant.  
- Xn symbol  
- N symbol  
- R: 22-38-50/53  
- S: 2-23-37/39-60-61  
- UN Hazard Class: 6.1  
- UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

International Chemical Safety Cards

http://www.cdc.gov/niosh/ipcsneng/neng1049.html

11/29/2011
# 1,2,4-TRICHLOROBENZENE

**ICSC: 1049**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>N</th>
<th>T</th>
<th>D</th>
<th>A</th>
<th>T</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE; APPEARANCE:</strong></td>
<td><strong>ROUTINES OF EXPOSURE:</strong></td>
<td><strong>PHYSICAL DANGERS:</strong></td>
<td><strong>CHEMICAL DANGERS:</strong></td>
<td><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></td>
<td><strong>INHALATION RISK:</strong></td>
<td><strong>EFFECTS OF SHORT-TERM EXPOSURE:</strong></td>
<td><strong>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</strong></td>
<td><strong>PHYSICAL PROPERTIES</strong></td>
<td><strong>ENVIRONMENTAL DATA</strong></td>
<td><strong>NOTES</strong></td>
<td><strong>ADDITIONAL INFORMATION</strong></td>
<td></td>
</tr>
<tr>
<td>COLOURLESS LIQUID OR WHITE CRYSTALS, WITH CHARACTERISTIC ODOUR.</td>
<td>The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</td>
<td>The substance decomposes on burning producing toxic fumes including hydrogen chloride. Reacts violently with oxidants.</td>
<td>The substance is irritating to the eyes, the skin and the respiratory tract.</td>
<td>The liquid defats the skin. The substance may have effects on the liver.</td>
<td>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</td>
<td></td>
<td></td>
<td></td>
<td>The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</td>
<td>The occupational exposure limit value should not be exceeded during any part of the working exposure. Also consult ICSC0344 1,3,5-Trichlorobenzene, and ICSC1222 1,2,3-Trichlorobenzene.</td>
<td>Transport Emergency Card: TEC (R)-61GT1-III NFPA Code: H2; F1; R0;</td>
<td></td>
</tr>
</tbody>
</table>

## PHYSICAL PROPERTIES

- Boiling point: 213°C
- Melting point: 17°C
- Relative density (water = 1): 1.5
- Solubility in water: 34.6 mg/l
- Vapour pressure, Pa at 25°C: 40
- Relative vapour density (air = 1): 6.26
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.002
- Flash point: 105°C c.c.
- Auto-ignition temperature: 571°C
- Explosive limits, vol% in air: 2.5-6.6 (at 150°C)
- Octanol/water partition coefficient as log Pow: 3.98

## ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

## NOTES

The occupational exposure limit value should not be exceeded during any part of the working exposure. Also consult ICSC0344 1,3,5-Trichlorobenzene, and ICSC1222 1,2,3-Trichlorobenzene.

Transport Emergency Card: TEC (R)-61GT1-III

NFPA Code: H2; F1; R0;

## ADDITIONAL INFORMATION

**ICSC: 1049**

(C) IPCS, CEC, 1994

**1,2,4-TRICHLOROBENZENE**

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

[http://www.cdc.gov/niosh/ipcsneng/neng1049.html](http://www.cdc.gov/niosh/ipcsneng/neng1049.html)

11/29/2011
# International Chemical Safety Cards

## 1,2,4-TRIMETHYLBENZENE

ICSC: 1433

| Molecular mass: 120.2 |

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Fire</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Alcohol-resistant foam, dry powder, carbon dioxide.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explosion</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 44°C explosive vapour/air mixtures may be formed.</td>
<td>Above 44°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
<td></td>
</tr>
</tbody>
</table>

### Exposure

- **Skin**: Redness. Dry skin. Protective gloves. Rinse skin with plenty of water or shower.
- **Eyes**: Redness. Pain. Safety spectacles. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
- **Ingestion**: (See Inhalation). Do not eat, drink, or smoke during work. Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

### Spillage Disposal

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.

### Storage


### Packaging & Labelling

Xn symbol
N symbol
R: 10-20-36/37/38-51/53
S: 2-26-61
UN Hazard Class: 3
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1,2,4-TRIMETHYLBENZENE

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (as mixed isomers) 25 ppm as TWA (ACGIH 2004).
MAK: (as mixed isomers) 20 ppm 100 mg/m³
Peak limitation category: II(2) Pregnancy risk group: C (DFG 2004).
OSHA PEL*: none
NIOSH REL: TWA 25 ppm (125 mg/m³)
NIOSH IDLH: N.D. See: IDLH INDEX

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin, and the respiratory tract. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure, resulting in chronic bronchitis. The substance may have effects on the central nervous system, blood. See Notes.

PHYSICAL PROPERTIES
Boiling point: 169°C
Melting point: -44°C
Relative density (water = 1): 0.88
Solubility in water: very poor
Relative vapour density (air = 1): 4.1

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

NOTES
Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. See also ICSC 1155 1,3,5-Trimethylbenzene (Mesitylene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethyl benzene (mixed isomers). 1,3,5-Trimethylbenzene (Mesitylene) is classified as a marine pollutant.

Transport Emergency Card: TEC (R)-30GF1-III
NFPA Code: H0; F2; R0;

ADDITIONAL INFORMATION

ICSC: 1433

1,2,4-TRIMETHYLBENZENE

(C) IPCS, CEC, 1994

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3-Chloro-1,2-dibromopropene  
DBCP  
1-Chloro-2,3-dibromopropene  
C₃H₅Br₂Cl  
Molecular mass: 236.4

ICSC: 0002  
CAS: 96-12-8  
RTECS: TX8750000  
UN: 2872  
EC: 602-021-00-6  
August 10, 2002 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 77°C explosive vapour/air mixtures may be formed.</td>
<td>Above 77°C closed system, ventilation.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>AVOID ALL CONTACT! PREVENT GENERATION OF MISTS! AVOID EXPOSURE OF (PREGNANT) WOMEN!</td>
<td></td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Redness.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL
Evacuate danger area! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: complete protective clothing including self-contained breathing apparatus.)

### STORAGE
Separated from food and feedstuffs, metals such as aluminium or magnesium. Well closed.

### PACKAGING & LABELLING
Unbreakable packaging; put breakable packaging into closed unbreakable container.
Do not transport with food and feedstuffs.
Note: E
T symbol
R: 45-46-60-25-48/20/22-52/53
S: 53-45-61
UN Hazard Class: 6.1
UN Packing Group: III

http://www.cdc.gov/niosh/ipcsneng/neng0002.html
# International Chemical Safety Cards

## 1,2-DIBROMO-3-CHLOROPROPANE

**ICSC: 0002**

### PHYSICAL STATE; APPEARANCE:
- Colourless liquid, with pungent odour.
- Technical grade: amber to dark brown liquid.

### PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

### CHEMICAL DANGERS:
The substance decomposes on heating above the boiling point and on burning producing toxic fumes including hydrogen bromide, hydrogen chloride. Reacts with aluminium, magnesium, tin and their alloys in presence of water. Attacks some forms of rubber and coatings.

### OCCUPATIONAL EXPOSURE LIMITS:
- TLV not established.
- MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2002).
- OSHA PEL: 1910.1044 TWA 0.001 ppm
- NIOSH REL: Ca See Appendix A
- NIOSH IDLH: Ca N.D. See: IDLH INDEX

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

### INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system and kidneys, resulting in impaired functions. Exposure could cause lowering of consciousness.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, lungs, kidneys and testes, resulting in impaired functions and tissue lesions. This substance is possibly carcinogenic to humans. Causes toxicity to human reproduction or development.

### PHYSICAL PROPERTIES
- Boiling point (decomposes): 196°C
- Melting point: 6.7°C
- Relative density (water = 1): 2.1
- Solubility in water: poor
- Vapour pressure, kPa at 20°C: 0.1
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
- Flash point: 77°C
- Octanol/water partition coefficient as log Pow: 2.96

### ENVIRONMENTAL DATA
The substance is harmful to aquatic organisms.

### NOTES
Depending on the degree of exposure, periodic medical examination is indicated. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-61GT1-III
NFPA Code: H2; F1; R1;

### ADDITIONAL INFORMATION

**ICSC: 0002**

1,2-DIBROMO-3-CHLOROPROPANE

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http://www.cdc.gov/niosh/ipcsneng/neng0002.html

12/7/2011
| LEGAL NOTICE: | The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |
# International Chemical Safety Cards

## ETHYlene DIBROMide

**ICSC: 0045**

1,2-Dibromoethane  
**EDB**  
**Br(CH₂)₂Br / C₂H₄Br₂**  
Molecular mass: 187.9

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0045</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>106-93-4</td>
</tr>
<tr>
<td>RTECS #</td>
<td>KH9275000</td>
</tr>
<tr>
<td>UN #</td>
<td>1605</td>
</tr>
<tr>
<td>EC #</td>
<td>602-010-00-6</td>
</tr>
<tr>
<td>April 27, 1993 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLOSION</td>
<td>Risk of fire and explosion on contact with powdered metals: see Chemical Dangers.</td>
</tr>
</tbody>
</table>

### ACUTE HAZARDS/SYMPTOMS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INGESTION</td>
<td>Pain. Redness. Severe deep burns.</td>
</tr>
<tr>
<td></td>
<td>EYES</td>
<td>Pain. Redness.</td>
</tr>
</tbody>
</table>

### PREVENTION

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>AVOID ALL CONTACT!</th>
</tr>
</thead>
<tbody>
<tr>
<td>INHALATION</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
</tr>
<tr>
<td>SKIN</td>
<td>Protective gloves. Protective clothing.</td>
</tr>
<tr>
<td>EYES</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
</tr>
</tbody>
</table>

### FIRST AID/FIRE FIGHTING

| FIRE | In case of fire in the surroundings: use appropriate extinguishing media. |

### SPILLAGE DISPOSAL

Evacuate danger area! Consult an expert!  
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.  
Personal protection: complete protective clothing including self-contained breathing apparatus.

### STORAGE

Separated from strong oxidants, strong bases, powdered metals, food and feedstuffs: see Chemical Dangers. Dry. Keep in the dark. Ventilation along the floor.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Marine pollutant.  
Note: E  
T symbol  
N symbol  
R: 45-23/24/25-36/37/38-51/53  
S: 53-45-61  
UN Hazard Class: 6.1  
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

[ICSC:NENG0045 International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH](http://www.cdc.gov/niosh/ipcsneng/neng0045.html)
# ETHYLENE DIBROMIDE

**ICSC: 0045**

## PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

## PHYSICAL DANGERS:

## CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes, hydrogen bromide (see ICSC0282) and bromine (see ICSC0107). The substance decomposes slowly under influence of light and moisture producing corrosive hydrogen bromide. Reacts vigorously with powdered aluminium or magnesium, metals such as sodium, potassium and calcium, strong bases and strong oxidants, causing fire and explosion hazard. Attacks fats, rubber, some forms of plastic, coatings.

## OCCUPATIONAL EXPOSURE LIMITS:

| TLV: (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). |
| MAK: skin absorption (H); Carcinogen category: 2; (DFG 2004). |
| OSHA PEL: TWA 20 ppm C 30 ppm 50 ppm 5-minute maximum peak |
| NIOSH REL: Ca TWA 0.045 ppm C 0.13 ppm 15-minute See Appendix A |
| NIOSH IDLH: Ca 100 ppm See: 106934 |

## PHYSICAL PROPERTIES

| Boiling point: 131°C |
| Melting point: 10°C |
| Relative density (water = 1): 2.2 |
| Solubility in water: poor |

## ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

## INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

## EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system, resulting in lowering of consciousness.

## EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Lungs may be affected by repeated or prolonged exposure causing bronchitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

## ENVIRONMENTAL DATA
This substance may be hazardous to the environment; special attention should be given to water.

## N O T E S
Depending on the degree of exposure, periodic medical examination is suggested. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, EU classification.

Transport Emergency Card: TEC (R)-61S1605

NFPA Code: H3; F0; R0;

## ADDITIONAL INFORMATION

**ICSC: 0045**

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## IMPORTANT LEGAL
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http://www.cdc.gov/niosh/ipcsneng/neng0045.html 12/7/2011
| NOTICE: | The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |
## INTERNATIONAL CHEMICAL SAFETY CARDS

### 1,2-DICHLOROBENZENE

**C₆H₄Cl₂**  
Molecular mass: 147.0

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### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
</tbody>
</table>

| EXPLOSION | Above 66°C explosive vapour/air mixtures may be formed. | Above 66°C use a closed system, ventilation. |

### EXPOSURE

| EYES | Redness. Pain. | Face shield. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

### STORAGE

Separated from aluminium, oxidants and food and feedstuffs.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Marine pollutant.  
Xn symbol

N symbol  
R: 22-36/37/38-50/53  
S: 2-23-60-61  
UN Hazard Class: 6.1  
UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1066**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**1,2-DICHLOROBENZENE**

<table>
<thead>
<tr>
<th>Physical State; Appearance:</th>
<th>Colourless to yellow liquid, with characteristic odour.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routes of Exposure:</td>
<td>The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</td>
</tr>
<tr>
<td>Inhalation Risk:</td>
<td>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</td>
</tr>
<tr>
<td>Effects of Short-term Exposure:</td>
<td>The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system and liver. Exposure could cause lowering of consciousness.</td>
</tr>
<tr>
<td>Effects of Long-term or Repeated Exposure:</td>
<td>The liquid defats the skin. The substance may have effects on the kidneys, blood.</td>
</tr>
</tbody>
</table>

**Physical Properties**

- Boiling point: 180-183°C
- Melting point: -17°C
- Relative density (water = 1): 1.3
- Solubility in water: very poor
- Vapour pressure, kPa at 20°C: 0.16
- Relative vapour density (air = 1): 5.1
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.006
- Flash point: 66°C c.c.
- Auto-ignition temperature: 648°C
- Explosive limits, vol% in air: 2.2-9.2
- Octanol/water partition coefficient as log Pow: 3.38

**Occupational Exposure Limits:**

- OSHA PEL: C 50 ppm (300 mg/m³)
- NIOSH REL: C 50 ppm (300 mg/m³)
- NIOSH IDLH: 200 ppm See: 95501
- TLV: 25 ppm as TWA; 50 ppm as STEL; A4; (ACGIH 2003).
- MAK: 10 ppm, 61 mg/m³; H;
- Peak limitation category: II(2); Pregnancy risk group: C;
- (DFG 2003).

**Environmental Data**

The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. It is strongly advised that this substance does not enter the environment.

**NOTES**

Transport Emergency Card: TEC (R)-61GT1-III

NFPA Code: H2; F2; R0;

**ADDITIONAL INFORMATION**

ICSC: 1066

(C) IPCS, CEC, 1994

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### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPOMTS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Vapour/air mixtures are explosive.</td>
<td>Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling.</td>
</tr>
</tbody>
</table>

### EXPOSURE

<table>
<thead>
<tr>
<th><strong>•INHALATION</strong></th>
<th>AVOID ALL CONTACT!</th>
<th>IN ALL CASES CONSULT A DOCTOR!</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>•SKIN</strong></th>
<th>Protective gloves.</th>
<th>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redness.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>•EYES</strong></th>
<th>Safety goggles face shield or eye protection in combination with breathing protection.</th>
<th>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>•INGESTION</strong></th>
<th>Do not eat, drink, or smoke during work. Wash hands before eating.</th>
<th>Give nothing to drink. Refer for medical attention.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal cramps. Diarrhoea. (Further see Inhalation).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Evacuate danger area! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: self-contained breathing apparatus.

### STORAGE

Fireproof. Separated from strong oxidants, food and feedstuffs, and other incompatible materials. See Chemical Dangers. Cool. Dry.

### PACKAGING & LABELLING

Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Marine pollutant.

Note: E
F symbol
T symbol
R: 45-11-22-36/37/38
**1,2-DICHLOROETHANE**

**ICSC: 0250**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOURLESS VISCOS LIQUID, WITH CHARACTERISTIC ODOUR. TURNS DARK ON EXPOSURE TO AIR, MOISTURE AND LIGHT.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL DANGERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEMICAL DANGERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance decomposes on heating and on burning producing toxic and corrosive fumes including hydrogen chloride (ICSC 0163) and phosgene (ICSC 0007). Reacts violently with aluminium, alkali metals, alkali amides, ammonia, bases, strong oxidants. Attacks many metals in presence of water. Attacks plastic.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OCCUPATIONAL EXPOSURE LIMITS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV: 10 ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2004).</td>
</tr>
<tr>
<td>MAK: skin absorption (H); Carcinogen category: 2; (DFG 2004).</td>
</tr>
<tr>
<td>OSHA PELs: TWA 50 ppm C 100 ppm 200 ppm 5-minute maximum peak in any 3 hours</td>
</tr>
<tr>
<td>NIOSH REL: Ca TWA 1 ppm (4 mg/m³) ST 2 ppm (8 mg/m³) See Appendix A See Appendix C (Chloroethanes)</td>
</tr>
</tbody>
</table>

| NIOSH IDLH: Ca 50 ppm See: 107062 |

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point: 83.5°C</td>
</tr>
<tr>
<td>Melting point: -35.7°C</td>
</tr>
<tr>
<td>Relative density (water = 1): 1.235</td>
</tr>
<tr>
<td>Solubility in water, g/100 ml: 0.87</td>
</tr>
<tr>
<td>Vapour pressure, kPa at 20°C: 8.7</td>
</tr>
<tr>
<td>Relative vapour density (air = 1): 3.42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2</td>
</tr>
<tr>
<td>Flash point: 13°C c.c.</td>
</tr>
<tr>
<td>Auto-ignition temperature: 413°C</td>
</tr>
<tr>
<td>Explosive limits, vol% in air: 6.2-16</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow: 1.48</td>
</tr>
</tbody>
</table>

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

Transport Emergency Card: TEC (R)-30GTF1-II

NFPA Code: H 2; F 3; R 0;
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# International Chemical Safety Cards

## 1,2-DICHLOROPROPANE

**ICSC: 0441**

- **ICSC #**: 0441
- **CAS #**: 78-87-5
- **RTECS #**: TX9625000
- **UN #**: 1279
- **EC #**: 602-020-00-0
- **March 25, 1999 Validated**

### TYPES OF HAZARD/EXPOSURE

#### FIRE

- **Acute Hazards/Symptoms**: Highly flammable.
- **Prevention**: NO open flames, NO sparks, and NO smoking.
- **First Aid/Fire Fighting**: Powder. Foam. Carbon dioxide.

#### EXPLOSION

- **Acute Hazards/Symptoms**: Vapour/air mixtures are explosive.
- **Prevention**: Closed system, ventilation, explosion-proof electrical equipment and lighting.
- **First Aid/Fire Fighting**: In case of fire: keep drums, etc., cool by spraying with water.

### EXPOSURE

#### INHALATION

- **Prevention**: Ventilation, local exhaust, or breathing protection.
- **First Aid/Fire Fighting**: Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

#### SKIN

- **Symptoms**: Dry skin. Redness. Pain.
- **Prevention**: Protective gloves.
- **First Aid/Fire Fighting**: First rinse with plenty of water, then remove contaminated clothes and rinse again. Refer for medical attention.

#### EYES

- **Symptoms**: Redness. Pain.
- **Prevention**: Safety goggles.
- **First Aid/Fire Fighting**: First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

#### INGESTION

- **Prevention**: Do not eat, drink, or smoke during work.
- **First Aid/Fire Fighting**: Rinse mouth. Refer for medical attention.

### SPILLAGE DISPOSAL

Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: self-contained breathing apparatus.

### STORAGE

Fireproof. Provision to contain effluent from fire extinguishing.

### PACKAGING & LABELLING

- **F symbol**
- **Xn symbol**
- **R: 11-20/22**
- **S: 2-16-24**
- **UN Hazard Class: 3**
- **UN Packing Group: II**

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

[http://www.cdc.gov/niosh/ipcsneng/neng0441.html](http://www.cdc.gov/niosh/ipcsneng/neng0441.html)
1,2-DICHLOROPROPANE

**PHYSICAL STATE; APPEARANCE:**
Colourless liquid, with characteristic odour.

**PHYSICAL DANGERS:**
The vapour is heavier than air and may travel along the ground; distant ignition possible.

**CHEMICAL DANGERS:**
On combustion, forms toxic and corrosive fumes. Attacks aluminium alloys and some types of plastics.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 10 ppm as TWA, SEN A4 (not classifiable as a human carcinogen); (ACGIH 2007).
Mak: Carcinogen category: 3B; (DFG 2006).
OSHA PEL*: TWA 75 ppm (350 mg/m³)
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca 400 ppm See: 78875

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance irritates the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The liquid defats the skin. The substance may have effects on the liver and kidneys.

**PHYSICAL PROPERTIES**
- Boiling point: 96°C
- Melting point: -100°C
- Relative density (water = 1): 1.16
- Solubility in water, g/100 ml at 20°C: 0.26
- Vapour pressure, kPa at 20°C: 27.9
- Relative vapour density (air = 1): 3.9
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.15
- Flash point: 16°C c.c.
- Auto-ignition temperature: 557°C
- Explosive limits, vol% in air: 3.4-14.5
- Octanol/water partition coefficient as log Pow: 2.02 (calculated)

**ENVIRONMENTAL DATA**

**NOTES**
Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.
Transport Emergency Card: TEC (R)-30S1279 or 30GF1-I+II
NFPA Code: H2; F3; R0;
Card has been partially updated in July 2007: see Occupational Exposure Limits.
Card has been partially updated in January 2008: see Fire fighting.

**ADDITIONAL INFORMATION**

ICSC: 0441
(C) IPCS, CEC, 1994

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### International Chemical Safety Cards

**1,3,5-TRIMETHYLBENZENE**

ICSC: 1155

Mesitylene  
\( C_9H_{12} \)  
Molecular mass: 120.2

**ICSC #** 1155  
**CAS #** 108-67-8  
**RTECS #** OX6825000  
**UN #** 2325  
**EC #** 601-025-00-5  
March 06, 2002 Peer reviewed

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Alcohol-resistant foam, dry powder, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 50°C explosive vapour/air mixtures may be formed.</td>
<td>Above 50°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

**EXPOSURE**

| • SKIN       | Redness. Dry skin. | Protective gloves. | Remove contaminated clothes. Rinse skin with plenty of water or shower. |
| • EYES       | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| • INGESTION  | (See Inhalation). Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

**SPILLAGE DISPOSAL**

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

**STORAGE**


**PACKAGING & LABELLING**

Marine pollutant.  
Xi symbol  
N symbol  
R: 10-37-51/53  
S: 2-61  
UN Hazard Class: 3  
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

**1,3,5-TRIMETHYLBENZENE**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>D</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE; APPEARANCE:</strong></td>
<td>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PHYSICAL DANGERS:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CHEMICAL DANGERS:</strong></td>
<td>The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></td>
<td>TLV (as mixed isomers): 25 ppm; (ACGIH 2001). MAK (all isomers): 20 ppm; 100 mg/m³; class II 1 © (2001) OSHA PEL*: none NIOSH REL: TWA 25 ppm (125 mg/m³) NIOSH IDLH: N.D. See: IDLH INDEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROUTES OF EXPOSURE:</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>INHALATION RISK:</strong></td>
<td>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>EFFECTS OF SHORT-TERM EXPOSURE:</strong></td>
<td>The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.</td>
<td></td>
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</tr>
<tr>
<td><strong>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</strong></td>
<td>The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure, resulting in chronic bronchitis. The substance may have effects on the central nervous system blood See Notes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PHYSICAL PROPERTIES</strong></td>
<td>Boiling point: 165°C Melting point: -45°C Relative density (water = 1): 0.86 Solubility in water: very poor Vapour pressure, kPa at 20°C: 0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL DATA</strong></td>
<td>The substance is harmful to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N O T E S</strong></td>
<td>Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. See ICSC 1433 1,2,4-Trimethylbenzene (Pseudocumene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethylbenzene (mixed isomers).</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>ADDITIONAL INFORMATION</strong></td>
<td>Transport Emergency Card: TEC (R)-30S2325 NFPA Code: H0; F2; R0</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>ICSC: 1155</strong></td>
<td>(C) IPCS, CEC, 1994</td>
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</tr>
</tbody>
</table>

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**1,3-DICHLOROBENZENE**

ICSC: 1095

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 63°C explosive vapour/air mixtures may be formed.</td>
<td>Above 63°C use a closed system, ventilation.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>PREVENT GENERATION OF MISTS!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>Redness. Pain.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: A/P2 filter respirator for organic vapour and harmful dust).

**STORAGE**

Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access. Separated from strong oxidants, aluminium, food and feedstuffs. Well closed.

**PACKAGING & LABELLING**

Do not transport with food and feedstuffs. Xn symbol N symbol R: 22-51/53 S: 2-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**1,3-DICHLOROBENZENE**  
ICSC: 1095

<table>
<thead>
<tr>
<th>I M P O R T A N T</th>
<th>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID</th>
<th>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS: The vapour is heavier than air.</td>
<td>INHALATION RISK: No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.</td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS: The substance decomposes on burning producing toxic fumes including hydrogen chloride. Reacts with strong oxidants. Reacts violently with aluminium.</td>
<td>EFFECTS OF SHORT-TERM EXPOSURE: The vapour irritates the eyes, the skin and the respiratory tract. See Notes.</td>
<td></td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV not established. MAK: 2 ppm, 12 mg/m³; Peak limitation category: II(2); Pregnancy risk group: C; (DFG 2008).</td>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the kidneys and liver. See Notes.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
<th>Boiling point: 173°C</th>
<th>Vapour pressure, kPa at 25°C: 0.286</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point: -24.8°C</td>
<td>Relative vapour density (air = 1): 5.1</td>
<td></td>
</tr>
<tr>
<td>Relative density (water = 1): 1.288</td>
<td>Flash point: 63°C</td>
<td></td>
</tr>
<tr>
<td>Solubility in water: none</td>
<td>Octanol/water partition coefficient as log Pow: 3.53</td>
<td></td>
</tr>
</tbody>
</table>

| ENVIRONMENTAL DATA | The substance is toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish. |

**NOTES**
Data on the toxicity of m-dichlorobenzene are limited. Also consult ICSC #0037 (p-Dichlorobenzene) and #1066 (o-Dichlorobenzene).
Card has been partially updated in November 2008: see Occupational Exposure Limits, Storage.

**ADDITIONAL INFORMATION**
ICSC: 1095 1,3-DICHLOROBENZENE
(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

[http://www.cdc.gov/niosh/ipcsneng/neng1095.html](http://www.cdc.gov/niosh/ipcsneng/neng1095.html)
1,3-DICHLOROPROPANE

C₃H₆Cl₂ / CH₂ClCH₂CH₂Cl
Molecular mass: 113.0

ICSC # 0724
CAS # 142-28-9
RTECS # TX9660000
UN # 1992
July 04, 1997 Validated

TYPES OF HAZARD/EXPOSURE

ACUTE HAZARDS/SYMPTOMS

PREVENTION

FIRST AID/ FIRE FIGHTING

FIRE

Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.

NO open flames, NO sparks, and NO smoking.

Powder, water spray, foam, carbon dioxide.

EXPLOSION

Above 16°C explosive vapour/air mixtures may be formed.

Above 16°C use a closed system, ventilation, and explosion-proof electrical equipment.

In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE

PREVENT GENERATION OF MISTS!

• INHALATION

Dizziness.

Ventilation, local exhaust, or breathing protection.

Fresh air, rest.

• SKIN

Redness. Pain.

Protective gloves.

First rinse with plenty of water, then remove contaminated clothes and rinse again.

• EYES

Redness. Pain.

Safety spectacles.

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

• INGESTION

Do not eat, drink, or smoke during work.

Rinse mouth. Do NOT induce vomiting.

SPILLAGE DISPOSAL


STORAGE


PACKAGING & LABELLING

Do not transport with food and feedstuffs. Marine pollutant.

UN Hazard Class: 3

UN Subsidiary Risks: 6.1

UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

1,3-DICHLOROPROPANE

ICSC: 0724

http://www.cdc.gov/niosh/ipcsneng/neng0724.html

12/7/2011
PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance decomposes on heating producing hydrogen chloride and phosgene.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTE OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES
- Boiling point: 120°C
- Melting point: -99°C
- Relative density (water = 1): 1.19
- Solubility in water, g/100 ml at 20°C: 0.3
- Vapour pressure, kPa at 20°C: 2.4
- Relative vapour density (air = 1): 3.9
- Flash point: 16°C o.c.
- Explosive limits, vol% in air: see Notes
- Octanol/water partition coefficient as log Pow: 2.0

ENVIRONMENTAL DATA

NOTES
Explosive limits are unknown in literature, although the substance is combustible and has a flash point < 61°C. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

Transport Emergency Card: TEC (R)-30G32

ADDITIONAL INFORMATION

ICSC: 0724
1,3-DICHLOROPROPANE
(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
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1,4-DICHLOROBENZENE

ICSC: 0037

**p-Dichlorobenzene**  
PDCB  
C₆H₄Cl₂  
Molecular mass: 147

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 66°C explosive vapour/air mixtures may be formed.</td>
<td>Above 66°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

**EXPOSURE**  
AVOID ALL CONTACT!

- **INHALATION**  
  Ventilation, local exhaust, or breathing protection.  
  Fresh air, rest. Refer for medical attention.

- **SKIN**  
  Protective gloves.  
  Remove contaminated clothes. Rinse and then wash skin with water and soap.

- **EYES**  
  Redness. Pain.  
  Safety goggles, or eye protection in combination with breathing protection.  
  First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**  
  Diarrhoea. (Further see Inhalation).  
  Do not eat, drink, or smoke during work.  
  Give plenty of water to drink. Refer for medical attention.

**SPILLAGE DISPOSAL**  
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.

**STORAGE**  
Provision to contain effluent from fire extinguishing. Separated from strong oxidants, food and feedstuffs. Keep in a well-ventilated room.

**PACKAGING & LABELLING**  
Do not transport with food and feedstuffs. Marine pollutant.  
Xn symbol  
N symbol  
R: 36-40-50/53  
S: 2-36/37-46-60-61  
UN Hazard Class: 9  
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0037

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
### Physical State; Appearance:
Colourless to white crystals, with characteristic odour.

### Physical Dangers:

### Chemical Dangers:
On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with strong oxidants.

### Occupational Exposure Limits:
- TLV: 10 ppm as TWA; A3; (ACGIH 2004).
- MAK: H;
- Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
- OSHA PEL†: TWA 75 ppm (450 mg/m³)
- NIOSH REL: Ca See Appendix A
- NIOSH IDLH: Ca 150 ppm See: 106467

### Routes of Exposure:
The substance can be absorbed into the body by inhalation and by ingestion.

### Inhalation Risk:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

### Effects of Short-Term Exposure:
The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the blood, resulting in haemolytic anaemia. The substance may cause effects on the central nervous system. Medical observation is indicated.

### Effects of Long-Term or Repeated Exposure:
The substance may have effects on the liver, kidneys and blood. This substance is possibly carcinogenic to humans.

### Physical Properties
- Boiling point: 174°C
- Melting point: 53°C
- Density: 1.2 g/cm³
- Solubility in water: at 25 °C 80 mg/l
- Vapour pressure, Pa at 20°C: 170
- Relative vapour density (air = 1): 5.08
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
- Flash point: 66°C c.c.
- Explosive limits, vol% in air: 6.2-16
- Octanol/water partition coefficient as log Pow: 3.37

### Environmental Data
The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

### Notes
Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-90GM7-III

NFPA Code: H 2; F 2; R 0;

### Additional Information

### Important Legal Notice:
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1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 2,2-Dichloropropane
Product Number : 36270
Brand : Fluka
Company : Sigma-Aldrich
            3050 Spruce Street
            SAINT LOUIS MO  63103
            USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C3H6Cl2
Molecular Weight : 112.99 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>594-20-7</td>
<td>209-832-0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable Liquid

HMIS Classification
Health Hazard: 0
Flammability: 3
Physical hazards: 0

NFPA Rating
Health Hazard: 0
Fire: 3
Reactivity Hazard: 0

Potential Health Effects

Inhalation : May be harmful if inhaled. May cause respiratory tract irritation.
Skin : May be harmful if absorbed through skin. May cause skin irritation.
Eyes : May cause eye irritation.
Ingestion : May be harmful if swallowed.

4. FIRST AID MEASURES
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point: -5.0 °C (23.0 °F) - closed cup
Ignition temperature: no data available

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods for cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition. No smoking. Take measures to prevent the build up of electrostatic charge.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

Recommended storage temperature: 2 - 8 °C
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
For prolonged or repeated contact use protective gloves.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid, clear
Colour colourless

Safety data
pH no data available
Melting point -35.0 °C (-31.0 °F)
Boiling point 66.0 - 69.0 °C (150.8 - 156.2 °F)
Flash point -5.0 °C (23.0 °F) - closed cup
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure 206.6 hPa (155.0 mmHg)
Density 1.09 g/cm³
Water solubility no data available
Partition coefficient: log Pow: 1.89
n-octanol/water

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Conditions to avoid
Heat, flames and sparks.
Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Hazardous reactions
Vapours may form explosive mixture with air.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
no data available

Irritation and corrosion
no data available

Sensitisation
no data available

Chronic exposure

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin May be harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Ingestion May be harmful if swallowed.

Additional Information
RTECS: TX9622500

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)
no data available

Ecotoxicity effects
no data available

Further information on ecology
no data available
13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1993 Class: 3 Packing group: II
Proper shipping name: Flammable liquids, n.o.s. (2,2-Dichloropropane)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1993 Class: 3 Packing group: II EMS-No: F-E, S-E
Proper shipping name: FLAMMABLE LIQUID, N.O.S. (2,2-Dichloropropane)
Marine pollutant: No

IATA
UN-Number: 1993 Class: 3 Packing group: II
Proper shipping name: Flammable liquid n.o.s. (2,2-Dichloropropane)

15. REGULATORY INFORMATION

OSHA Hazards
Flammable Liquid

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2-Dichloropropane</td>
<td>594-20-7</td>
<td>1991-07-01</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2-Dichloropropane</td>
<td>594-20-7</td>
<td>1991-07-01</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2-Dichloropropane</td>
<td>594-20-7</td>
<td>1991-07-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.
16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with
the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

**2-CHLOROTOLUENE**

ICSC: 1458

| ICSC # | 1458 |
| CAS #  | 95-49-8 |
| RTECS # | XS9000000 |
| UN #   | 2238 |
| EC #   | 602-040-00-X |

**Molecular mass:** 126.59

**1-Chloro-2-methylbenzene**

**o-Chlorotoluene**

**o-Tolyl chloride**

C<sub>7</sub>H<sub>7</sub>Cl / CH<sub>3</sub>C<sub>6</sub>H<sub>4</sub>Cl

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Carbon dioxide, water spray, foam, powder.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 43°C explosive vapour/air mixtures may be formed.</td>
<td>Above 43°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>PREVENT GENERATION OF MISTS!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• INHALATION</td>
<td>Cough. Shortness of breath. Dizziness.</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>• SKIN</td>
<td>Dry skin. Redness. Pain.</td>
<td>Protective gloves.</td>
<td>First rinse with plenty of water, then remove contaminated clothes and rinse again.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. (Extra personal protection: filter respirator for organic gases and vapours.) Do NOT let this chemical enter the environment.

**STORAGE**

Fireproof. Separated from strong oxidants.

**PACKAGING & LABELLING**

- Marine pollutant.
- Note: C
- Xn symbol
- N symbol
- R: 20-51/53
- S: 2-24/25-61
- UN Hazard Class: 3
- UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1458

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

[http://www.cdc.gov/niosh/ipcsneng/neng1458.html](http://www.cdc.gov/niosh/ipcsneng/neng1458.html)
**OSHA PELs, NIOSH RELs and NIOSH IDLH values.**

**International Chemical Safety Cards**

### 2-CHLOROTOLUENE

**ICSC: 1458**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>N</th>
<th>T</th>
<th>D</th>
<th>A</th>
<th>T</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE; APPEARANCE:</strong></td>
<td>COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</td>
<td><strong>ROUTINES OF EXPOSURE:</strong></td>
<td>The substance can be absorbed into the body by inhalation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PHYSICAL DANGERS:</strong></td>
<td></td>
<td><strong>INHALATION RISK:</strong></td>
<td>A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CHEMICAL DANGERS:</strong></td>
<td>On combustion, forms toxic and corrosive fumes including hydrogen chloride and phosgene. Reacts with oxidants.</td>
<td><strong>EFFECTS OF SHORT-TERM EXPOSURE:</strong></td>
<td>The substance is irritating to the eyes, the skin and the respiratory tract.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></td>
<td>TLV: 50 ppm as TWA; (ACGIH 2003). OSHA PEL*: none NIOSH REL: TWA 50 ppm (250 mg/m³) ST 75 ppm (375 mg/m³) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></td>
<td><strong>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</strong></td>
<td>The liquid defats the skin.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PHYSICAL PROPERTIES

| Boiling point: 159.2°C | Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 |
| Melting point: -35.1°C | Flash point: 43°C c.c. |
| Relative density (water = 1): 1.08 | Explosive limits, vol% in air: 1 - 12.6 |
| Solubility in water, g/100 ml at 20°C: 0.47 | Octanol/water partition coefficient as log Pow: 3.4 |
| Vapour pressure, kPa at 20°C: 0.35 |
| Relative vapour density (air = 1): 4.4 |

### ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to crustacea and fish.

### NOTES

Transport Emergency Card: TEC (R)-30GFI-III

NFPA Code: H2; F2; R0;

### ADDITIONAL INFORMATION

**ICSC: 1458**

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[http://www.cdc.gov/niosh/ipcsneng/neng1458.html](http://www.cdc.gov/niosh/ipcsneng/neng1458.html)
### International Chemical Safety Cards

#### 4-CHLOROTOLUENE

**ICSC:** 1386

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>1386</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>106-43-4</td>
</tr>
<tr>
<td>RTECS #</td>
<td>XS901000</td>
</tr>
<tr>
<td>UN #</td>
<td>2238</td>
</tr>
<tr>
<td>EC #</td>
<td>602-040-00-X</td>
</tr>
</tbody>
</table>

**Molecular mass:** 126.6

**p-Chlorotoluene**
1-Chloro-4-methylbenzene
p-Tolyl chloride
C₇H₇Cl

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 49°C explosive vapour/air mixtures may be formed.</td>
<td>Above 49°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

**EXPOSURE**

- **INHALATION**
  - Ventilation, local exhaust, or breathing protection.
  - Fresh air, rest.

- **SKIN**
  - Protective gloves. Protective clothing.
  - Remove contaminated clothes. Rinse and then wash skin with water and soap.

- **EYES**
  - Redness. Pain.
  - Safety spectacles.
  - First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**
  - Do not eat, drink, or smoke during work.
  - Do NOT induce vomiting. Refer for medical attention.

**SPILLAGE DISPOSAL**

- Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. (Extra personal protection: filter respirator for organic gases and vapours.)

**STORAGE**

- Fireproof. Separated from strong oxidants.

**PACKAGING & LABELLING**

- Marine pollutant.
- Note: C
- Xn symbol
- N symbol
- R: 20-51/53
- S: 2-24/25-61
- UN Hazard Class: 3
- UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

http://www.cdc.gov/niosh/ipcsneng/neng1386.html

12/7/2011
## 4-CHLOROTOLUENE

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>CHEMICAL DANGERS: On combustion, forms toxic gases including carbon monoxide, hydrogen chloride, possibly phosgene. Reacts with strong oxidants.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV not established. MAK not established.</td>
</tr>
<tr>
<td></td>
<td>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation.</td>
</tr>
<tr>
<td></td>
<td>INHALATION RISK:</td>
</tr>
<tr>
<td></td>
<td>EFFECTS OF SHORT-TERM EXPOSURE: Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis.</td>
</tr>
<tr>
<td></td>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The liquid defats the skin.</td>
</tr>
</tbody>
</table>

### PHYSICAL PROPERTIES
- Boiling point: 162°C
- Melting point: 7.5°C
- Relative density (water = 1): 1.07
- Solubility in water, g/100 ml at 20°C: 0.01
- Vapour pressure, kPa at 20°C: 0.35
- Relative vapour density (air = 1): 4.4
- Flash point: 49°C
- Auto-ignition temperature: 595°C
- Explosive limits, vol% in air: 0.7-12.2
- Octanol/water partition coefficient as log Pow: 3.33

### ENVIRONMENTAL DATA
- The substance is toxic to aquatic organisms.

### NOTES
- Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.
- Transport Emergency Card: TEC (R)-30G35c
- NFPA Code: H2; F2; R0;

### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>ICSC: 1386</th>
</tr>
</thead>
</table>

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### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th></th>
<th>Acute Hazards/ Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Highly flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers.</td>
<td>Closed system, ventilation, explosion-proof electrical equipment and lighting. DO NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

### Exposure

**AVOID ALL CONTACT!**

- **INHALATION**
  - Ventilation, local exhaust, or breathing protection.
  - Fresh air, rest. Refer for medical attention.

- **SKIN**
  - MAY BE ABSORBED! Dry skin. Redness. Pain. (Further see Inhalation).
  - Protective gloves. Protective clothing.
  - Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

- **EYES**
  - Redness. Pain.
  - Face shield, or eye protection in combination with breathing protection.
  - First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**
  - Abdominal pain. Sore throat. Vomiting. (Further see Inhalation).
  - Do not eat, drink, or smoke during work.
  - Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

### Spillage Disposal

Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. DO NOT wash away into sewer. DO NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

### Storage

Fireproof. Separated from food and feedstuffs oxidants halogens

### Packaging & Labelling

Do not transport with food and feedstuffs.

- Note: E
- F symbol
- T symbol
- R: 45-46-11-36/38-23/24/25-65
- S: 53-45
- UN Hazard Class: 3
- UN Packing Group: II

---

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.5 ppm as TWA 2.5 ppm as STEL (skin) A1 BEI (ACGIH 2004).
MAK: H
Carcinogen category: 1 Germ cell mutagen group: 3A (DFG 2004).
OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm See Appendix F
NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
NIOSH IDLH: Ca 500 ppm See: 71432

PHYSICAL PROPERTIES
Boiling point: 80°C
Melting point: 6°C
Relative density (water = 1): 0.88
Solubility in water, g/100 ml at 25°C: 0.18
Vapour pressure, kPa at 20°C: 10
Relative vapour density (air = 1): 2.7
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point: -11°C c.c.
Auto-ignition temperature: 498°C
Explosive limits, vol% in air: 1.2-8.0
Octanol/water partition coefficient as log Pow: 2.13

ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms.

NOTES
Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II
NFPA Code: H2; F3; R0

ADDITIONAL INFORMATION

ICSC: 0015

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# International Chemical Safety Cards

## ACETONE  
ICSC: 0087

**2-Propanone**  
**Dimethyl ketone**  
**Methyl ketone**  
**C₃H₆O / CH₃COCH₃**  
**Molecular mass: 58.1**

| ICSC # | 0087 |
| CAS # | 67-64-1 |
| RTECS # | AL3150000 |
| UN # | 1090 |
| EC # | 606-001-00-8 |
| April 22, 1994 Validated |
| Fi, review at IHE: 10/09/89 |

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SKIN</td>
<td>Dry skin.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain. Blurred vision. Possible corneal damage.</td>
<td>Safety spectacles or face shield. Contact lenses should not be worn.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Nausea. Vomiting. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL


### STORAGE

Fireproof. Separated from strong oxidants. Store in an area without drain or sewer access.

### PACKAGING & LABELLING

F symbol  
Xi symbol  
R: 11-36-66-67  
S: 2-9-16-26  
UN Hazard Class: 3  
UN Packing Group: II

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**ACETONE**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air and may travel along the ground; distant ignition possible.

**CHEMICAL DANGERS:**
The substance can form explosive peroxides on contact with strong oxidants such as acetic acid, nitric acid, hydrogen peroxide. Reacts with chloroform and bromoform under basic conditions, causing fire and explosion hazard. Attacks plastic.

**OCCUPATIONAL EXPOSURE LIMITS:**
| TLV: 500 ppm as TWA, 750 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2004). |
| MAK: 500 ppm 1200 mg/m³ |
| Peak limitation category: I(2); Pregnancy risk group: D; (DFG 2006). |
| OSHA PEL: TWA 1000 ppm (2400 mg/m³) |
| NIOSH REL: TWA 250 ppm (590 mg/m³) |
| NIOSH IDLH: 2500 ppm 10%LEL See: 6764 |

**PHYSICAL PROPERTIES**
- Boiling point: 56°C
- Melting point: -95°C
- Relative density (water = 1): 0.8
- Solubility in water: miscible
- Vapour pressure, kPa at 20°C: 24

**ENVIRONMENTAL DATA**
- Relative vapour density (air = 1): 2.0
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
- Flash point: -18°C c.c.
- Auto-ignition temperature: 465°C
- Explosive limits, vol% in air: 2.2-13
- Octanol/water partition coefficient as log Pow: -0.24

**NOTES**
Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1090
NFPA Code: H 1; F 3; R 0;
Card has been partially updated in July 2007: see Occupational Exposure Limits.
Card has been partially updated in January 2008: see Storage.

**ADDITIONAL INFORMATION**

**ICSC: 0087**

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**BROMOBENZENE**

Monobromobenzene  
Phenyl bromide  
\( \text{C}_6\text{H}_5\text{Br} \)  
Molecular mass: 157.02

ICSC # 1016  
CAS # 108-86-1  
RTECS # CY9000000  
UN # 2514  
EC # 602-060-00-9  
April 03, 2002 Validated

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Flammable.</td>
<td>NO open flames. NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, alcohol-resistant foam, water spray, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 51°C explosive vapour/air mixtures may be formed.</td>
<td>Above 51°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>PREVENT GENERATION OF MISTS!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INHALATION</strong></td>
<td>Dizziness.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Redness.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety spectacles.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Nausea. Diarrhoea.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove all ignition sources. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. (Extra personal protection: filter respirator for organic gases and vapours.)</td>
<td>Fireproof. Ventilation along the floor.</td>
<td>Do not transport with food and feedstuffs. Marine pollutant. Xi symbol N symbol R: 10-38-51/53 S: 2-61 UN Hazard Class: 3 UN Packing Group: III</td>
</tr>
</tbody>
</table>

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**BROMOBENZENE**

<table>
<thead>
<tr>
<th>PHYSICAL STATE: APPEARANCE:</th>
<th>ROUTES OF EXPOSURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</td>
<td>The substance can be absorbed into the body by inhalation and by ingestion.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL DANGERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a result of flow, agitation, etc., electrostatic charges can be generated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEMICAL DANGERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>On combustion, forms toxic gases including hydrogen bromide.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OCCUPATIONAL EXPOSURE LIMITS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV not established.</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>156.2°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>-30.7°C</td>
</tr>
<tr>
<td>Relative density (water = 1)</td>
<td>1.5</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>0.04 g/100 ml at 25°C</td>
</tr>
<tr>
<td>Vapour pressure, kPa at 25°C</td>
<td>0.55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance is toxic to aquatic organisms.</td>
</tr>
</tbody>
</table>

**NOTES**

Transport Emergency Card: TEC (R)-30GF1-III

NFPA Code: H2; F2; R0.

**ADDITIONAL INFORMATION**

**ICSC: 1016**

(C) IPCS, CEC, 1994

<table>
<thead>
<tr>
<th>IMPORTANT LEGAL NOTICE:</th>
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</tr>
</tbody>
</table>

http://www.cdc.gov/niosh/ipcsneng/neng1016.html
## Bromochloromethane

**Chlorobromomethane**  
Methylene chlorobromide  
\( \text{CH}_2\text{BrCl} \)  
Molecular mass: 129.4

### International Chemical Safety Cards

**ICSC: 0392**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
</tbody>
</table>

**EXPLOSION**

**EXPOSURE**

**PREVENT GENERATION OF MISTS!**

**INHALATION**

Nausea. Unconsciousness.  
Ventilation, local exhaust, or breathing protection.  
Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.

**SKIN**

Dry skin. Redness.  
Protective gloves.  
Remove contaminated clothes. Rinse skin with plenty of water or shower.

**EYES**

Redness.  
Safety spectacles or eye protection in combination with breathing protection.  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**INGESTION**

(Further see Inhalation).  
Do not eat, drink, or smoke during work.  
Do NOT induce vomiting. Refer for medical attention.

### Spillage Disposal

Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer, then remove to safe place. Personal protection: A filter respirator for organic gases and vapours.

### Storage

Separated from food and feedstuffs. Dry. Ventilation along the floor.

### Packaging & Labelling

Do not transport with food and feedstuffs.  
UN Hazard Class: 6.1  
UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

**Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.**
PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride, phosgene, hydrogen bromide. Attacks many metals including steel, aluminium, magnesium and zinc unless inhibited.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 200 ppm as TWA; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL: TWA 200 ppm (1050 mg/m³)
NIOSH REL: TWA 200 ppm (1050 mg/m³)
NIOSH IDLH: 2000 ppm See: 74975

PHYSICAL PROPERTIES
Boiling point: 68°C
Melting point: -88°C
Relative density (water = 1): 2.0
Solubility in water: poor

Vapour pressure, kPa at 20°C: 15.6
Relative vapour density (air = 1): 4.5

ENVIRONMENTAL DATA

NOTES
The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. Halon 1011 is a trade name. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

Transport Emergency Card: TEC (R)-61GT1-III

ADDITIONAL INFORMATION

ICSC: 0392
(BROMOCHLOROMETHANE)
(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
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**BROMODICHLOROMETHANE**

Dichlorobromomethane  
Methane, bromodichloro-  
CHBrCl₂  
Molecular mass: 163.8

ICSC # 0393  
CAS # 75-27-4  
RTECS # PA5310000  
April 03, 2006 Validated

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPOMTS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>AVOID ALL CONTACT!</th>
</tr>
</thead>
<tbody>
<tr>
<td>• INHALATION</td>
<td>See Notes.</td>
</tr>
<tr>
<td>• SKIN</td>
<td>Protective gloves. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Safety spectacles First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. Do not eat, drink, or smoke during work. Rinse mouth.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separated from strong oxidants, strong bases and magnesium. Ventilation along the floor.</td>
<td>Signal: Warning Excl mark-Health haz Harmful if swallowed Suspected of causing cancer May causes damage to liver and kidneys through prolonged or repeated exposure if swallowed</td>
<td></td>
</tr>
</tbody>
</table>

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (© IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

http://www.cdc.gov/niosh/ipcsneng/neng0393.html
COLOURLESS LIQUID

**PHYSICAL DANGERS:**
The vapour is heavier than air.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases, including hydrogen bromide and hydrogen chloride.
Reacts with strong bases, strong oxidants and magnesium.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.
MAK: skin absorption (H);
Carcinogen category: 2; Germ cell mutagen group: 3B (DFG 2009).

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point: 90°C</td>
<td></td>
</tr>
<tr>
<td>Melting point: -57°C</td>
<td></td>
</tr>
<tr>
<td>Density: 1.9 g/cm³</td>
<td></td>
</tr>
<tr>
<td>Solubility in water, g/100 ml at 20°C: 0.45 (poor)</td>
<td></td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL DATA**

**NOTES**
Halon 1021 is a trade name. Bromodichloromethane can be found in chlorinated water. Health effects of exposure to the substance have not been investigated adequately other than by ingestion.

Card has been partially updated in August 2007: see GHS classification.
Card has been partially updated in April 2010: see Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0393**
(B) IPCS, CEC, 1994

**BROMODICHLOROMETHANE**

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# International Chemical Safety Cards

## BROMOFORM

ICSC: 0108

Tribromomethane  
Methenyl tribromide  
CHBr₃  
Molecular mass: 252.7

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td>STRICT HYGIENE!</td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! Redness. (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Safety spectacles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Burning sensation. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Evacuate danger area! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

Separated from strong bases, food and feedstuffs, oxidants, metals. Keep in the dark. Ventilation along the floor. Store only if stabilized.

Do not transport with food and feedstuffs. Marine pollutant.

T symbol  
N symbol  
R: 23-36/38-51/53  
S: 1/2-28-45-61  
UN Hazard Class: 6.1  
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the

http://www.cdc.gov/niosh/ipcsneng/neng0108.html  
12/7/2011
BROMOFORM

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR. TURNS YELLOW ON EXPOSURE TO LIGHT AND AIR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on heating producing toxic and corrosive fumes including hydrogen bromide and bromine. The substance is a weak acid. Reacts violently with oxidants, bases in powdered form and is corrosive to most metals. Reacts with alkaline metals, powdered aluminium, zinc, magnesium, and acetone under basic conditions, causing fire and explosion hazard. Attacks some forms of plastic, rubber, coatings.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.5 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: Carcinogen category: 3B; (DFG 2004).
OSHA PEL: TWA 0.5 ppm (5 mg/m³) skin
NIOSH REL: TWA 0.5 ppm (5 mg/m³) skin
NIOSH IDLH: 850 ppm See: 75252

PHYSICAL PROPERTIES
Boiling point: 149-152°C
Melting point: 8.3°C
Relative density (water = 1): 2.9
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 0.7
Relative vapour density (air = 1): 8.7
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.05
Octanol/water partition coefficient as log Pow: 2.38

ENVIRONMENTAL DATA
This substance may be hazardous to the environment; special attention should be given to aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.

NOTES
Depending on the degree of exposure, periodic medical examination is suggested. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Do NOT take working clothes home. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-61S2515

ADDITIONAL INFORMATION

ICSC: 0108

BROMOFORM

(C) IPCS, CEC, 1994

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http://www.cdc.gov/niosh/ipcsneng/neng0108.html 12/7/2011
LEGAL NOTICE: The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# Methyl Bromide

**ICSC:** 0109

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0109</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>74-83-9</td>
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<tr>
<td>RTECS #</td>
<td>PA4900000</td>
</tr>
<tr>
<td>UN #</td>
<td>1062</td>
</tr>
<tr>
<td>EC #</td>
<td>602-002-00-2</td>
</tr>
<tr>
<td>November 25, 2009 Validated</td>
<td></td>
</tr>
<tr>
<td>Fi, review at IHE: 10/09/89</td>
<td></td>
</tr>
</tbody>
</table>

## Types of Hazard / Exposure

<table>
<thead>
<tr>
<th>Types of Hazard / Exposure</th>
<th>Acute Hazards / Symptoms</th>
<th>Prevention</th>
<th>First Aid / Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with aluminium, zinc, magnesium or pure oxygen.</td>
<td>Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with appropriate extinguishing agent.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Risk of fire and explosion on contact with aluminium, zinc, magnesium or oxygen.</td>
<td></td>
<td>In case of fire: keep cylinder cool by spraying with water.</td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td></td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.</td>
</tr>
</tbody>
</table>

## Spillage Disposal

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. NEVER direct water.

## Storage

Fireproof if in building. Separated from strong oxidants, aluminium and cylinders containing oxygen. Cool. Ventilation along the floor.

## Packaging & Labelling

<table>
<thead>
<tr>
<th>T</th>
<th>N</th>
<th>R</th>
</tr>
</thead>
</table>

[ICSC:NENG0109](http://www.cdc.gov/niosh/ipcsneng/neng0109.html) International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH

12/7/2011
METHYL BROMIDE

PHYSICAL STATE; APPEARANCE: ODOURLESS AND COLOURLESS COMPRESSED LIQUEFIED GAS.

PHYSICAL DANGERS: The gas is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

CHEMICAL DANGERS: The substance decomposes on heating producing toxic and corrosive fumes including hydrogen bromide, bromine and carbon oxybromide. Reacts with strong oxidants. Attacks many metals in presence of water. Attacks aluminium, zinc and magnesium with formation of pyrophoric compounds, causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS: TLV: 1 ppm as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2009).

MAK: skin absorption (H); Carcinogen category: 3B; BLW issued (DFG 2009).

OSHA PEL: C 20 ppm (80 mg/m³) skin

NIOSH REL: Ca See Appendix A

NIOSH IDLH: Ca 250 ppm See: 74839

PHYSICAL PROPERTIES

Boiling point: 4°C
Melting point: -94°C
Relative density (water = 1): 1.7 at 0°C
Solubility in water, g/100 ml at 20°C: 1.5
instead of Solubility in water, ml/100 ml at 20°C: 1.5
sister PI suggestion Vapour pressure, kPa at 20°C: 1893

ROUTE OF EXPOSURE: The substance can be absorbed into the body by inhalation and through the skin, also as a vapour!

INHALATION RISK: On loss of containment, a harmful concentration of this gas in the air will be reached very quickly.

EFFECTS OF SHORT-TERM EXPOSURE: The substance, as a liquid, is severely irritating to the skin and is irritating to the eyes and the respiratory tract. Inhalation may cause lung oedema (see Notes). Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system, and kidneys. The effects may be delayed up to 48 hours. Exposure at high levels may result in death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

Relative vapour density (air = 1): 3.3
Flash point: 194°C
Auto-ignition temperature: 537°C
Explosive limits, vol% in air: 10-16
Octanol/water partition coefficient as log Pow: 1.19

The substance is toxic to aquatic organisms. This substance may be hazardous to the environment;
**ENVIRONMENTAL DATA**

| special attention should be given to its impact on the ozone layer. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal. |

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Toxic effects on the nervous system may be delayed for several hours. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. by IPCS Dec 09 - since inhal symptoms mentions delayed effects and these are not just pulmonary.

NFPA Code: H 3; F 1; R 0;

**ADDITIONAL INFORMATION**

**ICSC: 0109**

METHYL BROMIDE

(C) IPCS, CEC, 1994

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**International Chemical Safety Cards**

**CARBON TETRACHLORIDE**

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0024</th>
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</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>56-23-5</td>
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<tr>
<td>RTECS #</td>
<td>FG4900000</td>
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<td>UN #</td>
<td>1846</td>
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<td>EC #</td>
<td>602-008-00-5</td>
</tr>
</tbody>
</table>

**Molecular mass:** 153.8

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>AVOID ALL CONTACT!</td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. Diarrhoea. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

### STORAGE

Separated from food and feedstuffs, metals (see Chemical Dangers). Ventilation along the floor. Cool.

### PACKAGING & LABELLING


See important information on back.
# International Chemical Safety Cards

## CARBON TETRACHLORIDE

**ICSC: 0024**

### PHYSICAL STATE; APPEARANCE:

COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:

The vapour is heavier than air.

### CHEMICAL DANGERS:

On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride ICSC0163, chlorine fumes ICSC0126, phosgene ICSC0007). Reacts with some metals such as aluminium, magnesium, zinc causing fire and explosion hazard.

### OCCUPATIONAL EXPOSURE LIMITS:

**TLV:** 5 ppm as TWA, 10 ppm as STEL; (skin); A2 (suspected human carcinogen); (ACGIH 2004).

**MAK:** 0.5 ppm, 3.2 mg/m³; Peak limitation category: II(2); skin absorption (H);

Carcinogen category: 4; Pregnancy risk group: C; (DFG 2006).

**OSHA PEL†:** TWA 10 ppm C 25 ppm 200 ppm (5-minute maximum peak in any 4 hours)

**NIOSH REL:** Ca ST 2 ppm (12.6 mg/m³) 60-minute See Appendix A

**NIOSH IDLH:** Ca 200 ppm See: 56235

### ROUTES OF EXPOSURE:

The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

### INHALATION RISK:

A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:

The substance is irritating to the eyes. The substance may cause effects on the liver, kidneys and central nervous system, resulting in unconsciousness. Medical observation is indicated.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

Repeated or prolonged contact with skin may cause dermatitis. This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES

- **Boiling point:** 76.5°C
- **Melting point:** -23°C
- **Relative density (water = 1):** 1.59
- **Solubility in water, g/100 ml at 20°C:** 0.1
- **Vapour pressure, kPa at 20°C:** 12.2
- **Relative vapour density (air = 1):** 5.3
- **Relative density of the vapour/air-mixture at 20°C:** 1.5
- **Octanol/water partition coefficient as log Pow:** 2.64

### ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to its impact on the ozone layer.

### NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, Emergency Response. Card has been partly updated in October 2006. See sections Occupational Exposure Limits and Ingestion first aid.

Transport Emergency Card: TEC (R)-61S1846

NFPA Code: H 3; F 0; R 0;

### ADDITIONAL INFORMATION

(C) IPCS, CEC, 1994

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http://www.cdc.gov/niosh/ipcsneng/neng0024.html

12/7/2011
IMPORTANT LEGAL NOTICE:
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# International Chemical Safety Cards

## CHLOROBENZENE

**ICSC: 0642**

Benzene chloride  
Chlorobenzol  
Phenyl chloride  
\( \text{C}_6\text{H}_5\text{Cl} \)

Molecular mass: 112.6

<table>
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<tr>
<td>CAS #</td>
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<td>EC #</td>
<td>602-033-00-1</td>
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</table>

November 27, 2003 Peer reviewed

## Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 27°C explosive vapour/air mixtures may be formed.</td>
<td>Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

## Exposure

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th></th>
</tr>
</thead>
</table>

### Inhalation
Ventilation, local exhaust, or breathing protection.  
Fresh air, rest. Refer for medical attention.

### Skin
Redness. Dry skin.  
Protective gloves.  
Refer for medical attention.

### Eyes
Redness. Pain.  
Safety goggles, or eye protection in combination with breathing protection.  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

### Ingestion
Abdominal pain. (See Inhalation).  
Do not eat, drink, or smoke during work.  
Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

## Spillage Disposal
Ventilation. Remove all ignition sources.  
Collect leaking and spilled liquid in sealable containers as far as possible.  
Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

## Storage
Fireproof. Separated from strong oxidants.

## Packaging & Labelling
Xn symbol  
N symbol  
R: 10-20-51/53  
S: 2-24/25-61  
UN Hazard Class: 3  
UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

**CHLOROBENZENE**

<table>
<thead>
<tr>
<th>I</th>
<th>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>PHYSICAL DANGERS:</td>
</tr>
<tr>
<td>P</td>
<td>CHEMICAL DANGERS: The substance decomposes on heating, on contact with hot surfaces or flames producing toxic and corrosive fumes. Reacts violently with strong oxidants causing fire and explosion hazard. Attacks rubber and some plastic.</td>
</tr>
<tr>
<td>O</td>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
</tr>
<tr>
<td>R</td>
<td>TLV: 10 ppm as TWA; A3; BEI issued; (ACGIH 2003).</td>
</tr>
<tr>
<td>T</td>
<td>MAK: 10 ppm, 47 mg/m³; Peak limitation category: II(2); Pregnancy risk group: C; (DFG 2003).</td>
</tr>
<tr>
<td>A</td>
<td>OSHA PEL: TWA 75 ppm (350 mg/m³)</td>
</tr>
<tr>
<td>N</td>
<td>NIOSH REL: See Appendix D</td>
</tr>
<tr>
<td>T</td>
<td>NIOSH IDLH: 100 ppm See: 108907</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROUTES OF EXPOSURE:</th>
<th>The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INHALATION RISK:</td>
<td>A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</td>
</tr>
<tr>
<td>EFFECTS OF SHORT-TERM EXPOSURE:</td>
<td>The substance is irritating to the eyes and the skin. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system, resulting in lowering of consciousness.</td>
</tr>
<tr>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</td>
<td>The liquid defats the skin. The substance may have effects on the liver and kidneys.</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 132°C
- Melting point: -45°C
- Relative density (water = 1): 1.11
- Solubility in water, g/100 ml at 20°C: 0.05
- Vapour pressure, kPa at 20°C: 1.17
- Relative vapour density (air = 1): 3.88

**ENVIRONMENTAL DATA**

The substance is harmful to aquatic organisms. It is strongly advised that this substance does not enter the environment.

**NOTES**

Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Transport Emergency Card: TEC (R)-30S1134 |

NFPA Code: H2; F3; R0; |

**ADDITIONAL INFORMATION**

**ICSC: 0642** |

(C) IPCS, CEC, 1994 |

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Ethyl chloride
Monochloroethane
C₂H₅Cl / CH₃CH₂Cl
Molecular mass: 64.5
(cylinder)

ICSC #    0132
CAS #     75-00-3
RTECS #   KH7525000
UN #       1037
EC #       602-009-00-0

October 04, 2000 Validated

TYPES OF HAZARD/EXPOSURE

ACUTE HAZARDS/SYMPOTMS

PREVENTION

FIRST AID/FIRE FIGHTING

FIRE
Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.

NO open flames, NO sparks, and NO smoking.

Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.

EXPLOSION
Gas/air mixtures are explosive.

Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding) if in liquid state. Use non-sparking handtools.

In case of fire: keep cylinder cool by spraying with water.

EXPOSURE

STRICT HYGIENE!

• INHALATION
   Ventilation, local exhaust, or breathing protection.
   Fresh air, rest. Refer for medical attention.

• SKIN
   ON CONTACT WITH LIQUID: FROSTBITE.
   Cold-insulating gloves. Protective clothing.
   ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

• EYES
   Face shield or eye protection in combination with breathing protection.
   First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

• INGESTION
   Do not eat, drink, or smoke during work.

SPILLAGE DISPOSAL

STORAGE

PACKAGING & LABELLING

Evacuate danger area! Consult an expert! Ventilation. Personal protection: self-contained breathing apparatus. Do NOT let this chemical enter the environment.

Fireproof.

Special insulated cylinder. Special fittings. F+ symbol
Xn symbol
R: 12-40/52/53
S: 2-9-16-33-36/37-61
UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK
# International Chemical Safety Cards

## 1-CHLOROETHANE

**ICSC: 0132**

### PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:
The gas is heavier than air and may travel along the ground; distant ignition possible.

### CHEMICAL DANGERS:
The substance decomposes on heating or on burning producing toxic gases (hydrogen chloride - see ICSC 0163, phosgene - see ICSC 0007).

### OCCUPATIONAL EXPOSURE LIMITS:
- **TLV:** 100 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
- **MAK:** skin absorption (H); Carcinogen category: 3B; (DFG 2004).
- **EU OEL:** 268 mg/m³; 1200 ppm as TWA (EU 2006).
- **OSHA PEL:** TWA 1000 ppm (2600 mg/m³)
- **NIOSH REL:** Handle with caution in the workplace. See Appendix C (Chloroethanes)
- **NIOSH IDLH:** 3800 ppm 10%LEL See: 75003

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

### INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance is mildly irritating to the eyes, the skin and the respiratory tract. Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system. Exposure far above the OEL may result in unconsciousness, cardiac dysrhythmia and death.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

### PHYSICAL PROPERTIES
- **Boiling point:** 12.5°C
- **Melting point:** -138°C
- **Relative density (water = 1):** 0.918
- **Solubility in water, g/100 ml at 20°C:** 0.574
- **Vapour pressure, kPa at 20°C:** 133.3
- **Relative vapour density (air = 1):** 2.22
- **Flash point:** -50°C c.c.
- **Auto-ignition temperature:** 519°C
- **Explosive limits, vol% in air:** 3.6-14.8
- **Octanol/water partition coefficient as log Pow:** 1.54

### ENVIRONMENTAL DATA
The substance is harmful to aquatic organisms.

### NOTES
Use of alcoholic beverages enhances the harmful effect. Rinse contaminated clothes (fire hazard) with plenty of water. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Card has been partly updated in April 2005: see sections Occupational Exposure Limits, Emergency Response. Card has been partly updated in October 2006: see section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1037 or 20G2F

NFPA Code: H 2; F 4; R 0;

### ADDITIONAL INFORMATION

**ICSC: 0132**

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made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

## CHLOROFORM

**ICSC:** 0027

Trichloromethane  
Methane trichloride  
Formyl trichloride  
CHCl₃  
Molecular mass: 119.4

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. See Notes. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>•EYES</strong></td>
<td>Redness. Pain.</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>•INGESTION</strong></td>
<td>Abdominal pain. Vomiting. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Give plenty of water to drink. Rest. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

### STORAGE

Separated from food and feedstuffs and incompatible materials (see Chemical Dangers). Ventilation along the floor.

### PACKAGING & LABELLING

Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.

Xn symbol  
R: 22-38-40-48/20/22  
S: 2-36/37  
UN Hazard Class: 6.1  
UN Packing Group: III

---

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the

12/7/2011

http://www.cdc.gov/niosh/ipcsneng/neng0027.html
CHLOROFORM

PHYSICAL STATE; APPEARANCE:
VOLATILE COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride ICSC0163, phosgene ICSC0007 and chlorine fumes ICSC0126). Reacts violently with strong bases, strong oxidants, some metals, such as aluminium, magnesium and zinc, causing fire and explosion hazard. Attacks plastic, rubber and coatings.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 ppm as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: 0.5 ppm, 2.5 mg/m³; Peak limitation category: II(2); skin absorption (H); Carcinogen category: 4; Pregnancy risk group: C; (DFG 2004).
OSHA PEL†: C 50 ppm (240 mg/m³)
NIOSH REL: Ca ST 2 ppm (9.78 mg/m³) 60-minute See Appendix A
NIOSH IDLH: Ca 500 ppm See: 67663

PHYSICAL PROPERTIES
Boiling point: 62°C
Melting point: -64°C
Relative density (water = 1): 1.48
Solubility in water, g/100 ml at 20°C: 0.8
Vapour pressure, kPa at 20°C: 21.2
Relative vapour density (air = 1): 4.12
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.7
Octanol/water partition coefficient as log Pow: 1.97

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms.

NOTES
Turns combustible on addition of small amounts of a flammable substance or an increase in the oxygen content of the air. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1888
NFPA Code: H 2; F 0; R 0;

ADDITIONAL INFORMATION

ICSC: 0027
(C) IPCS, CEC, 1994

http://www.cdc.gov/niosh/ipcsneng/neng0027.html
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METHYL CHLORIDE

ICSC: 0419

Chloromethane
Monochloromethane
CH₃Cl
Molecular mass: 50.5

TYPES OF HAZARD/EXPOSURE

FIRE
Highly flammable. Heating will cause rise in pressure with risk of bursting.

PREVENTION
NO open flames, NO sparks, and NO smoking.

FIRST AID/FIRE FIGHTING
Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray.

EXPLOSION
Gas/air mixtures are explosive.

PREVENTION
Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.

FIRST AID/FIRE FIGHTING
In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.

EXPOSURE

STRICT HYGIENE!

INHALATION

PREVENTION
Ventilation, local exhaust, or breathing protection.

FIRST AID/FIRE FIGHTING
Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

SKIN
MAY BE ABSORBED! ON CONTACT WITH LIQUID: FROSTBITE.

PREVENTION
Cold-insulating gloves. Protective clothing.

FIRST AID/FIRE FIGHTING
ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.

EYES
(See Skin).

PREVENTION
Safety goggles face shield or eye protection in combination with breathing protection.

SPILLAGE DISPOSAL
Evacuate danger area! Consult an expert! Ventilation. NEVER direct water jet on liquid. Personal protection: complete protective clothing including self-contained breathing apparatus.

STORAGE
Fireproof. Ventilation along the floor.

PACKAGING & LABELLING
F+ symbol
Xn symbol
R: 12-40-48/20
S: 2-9-16-33
UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**METHYL CHLORIDE**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOURLESS LIQUEFIED GAS.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL DANGERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The gas is heavier than air and may travel along the ground; distant ignition possible, and may accumulate in low ceiling spaces causing deficiency of oxygen. See Notes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEMICAL DANGERS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance decomposes on burning producing toxic and corrosive fumes including hydrogen chloride and phosgene. Reacts violently with powdered aluminium, powdered zinc, aluminium trichloride and ethylene causing fire and explosion hazard. Attacks many metals in the presence of moisture.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OCCUPATIONAL EXPOSURE LIMITS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV: 50 ppm as TWA, 100 ppm as STEL; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2004).</td>
</tr>
<tr>
<td>MAK: 50 ppm 100 mg/m³;</td>
</tr>
<tr>
<td>Peak limitation category: II(2);</td>
</tr>
<tr>
<td>skin absorption (H);</td>
</tr>
<tr>
<td>Carcinogen category: 3B; Pregnancy risk group: B; (DFG 2004).</td>
</tr>
<tr>
<td>OSHA PEL: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3 hours)</td>
</tr>
<tr>
<td>NIOSH REL: Ca See Appendix A</td>
</tr>
<tr>
<td>NIOSH IDLH: Ca 2000 ppm See: 74873</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point: -24.2°C</td>
</tr>
<tr>
<td>Melting point: -97.6°C</td>
</tr>
<tr>
<td>Relative density (water = 1): 0.92</td>
</tr>
<tr>
<td>Solubility in water, g/100 ml at 25°C: 0.5</td>
</tr>
<tr>
<td>Vapour pressure, kPa at 21°C: 506</td>
</tr>
<tr>
<td>Relative vapour density (air = 1): 1.8</td>
</tr>
<tr>
<td>Flash point: Flammable Gas</td>
</tr>
<tr>
<td>Auto-ignition temperature: 632°C</td>
</tr>
<tr>
<td>Explosive limits, vol% in air: 8.1-17.4</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow: 0.91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL DATA</th>
</tr>
</thead>
</table>

NOTES
Following intoxication patient should be observed carefully for 48 hours. Check oxygen content before entering area. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

Transport Emergency Card: TEC (R)-20S1063 or 20G2F

NFPA Code: H2; F4; R0;

ADDITIONAL INFORMATION

ICSC: 0419

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Material Safety Data Sheet

cis-1,2-Dichloroethylene, 97%

ACC# 97773

Section 1 - Chemical Product and Company Identification

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers: AC113380000, AC113380025, AC113380100
Synonyms: cis-Acetylene dichloride.
Company Identification:
   Acros Organics N.V.
   One Reagent Lane
   Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>156-59-2</td>
<td>cis-1,2-Dichloroethylene</td>
<td>97</td>
<td>205-859-7</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.

Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.

Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
Chronic: Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.

**Extinguishing Media:** Use water fog, dry chemical, carbon dioxide, or regular foam.

**Flash Point:** 6 deg C (42.80 deg F)

**Autoignition Temperature:** 440 deg C (824.00 deg F)

**Explosion Limits, Lower:** 9.70 vol %

**Upper:** 12.80 vol %

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.

**Storage:** Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**Exposure Limits**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>cis-1,2-Dichloroethylene</td>
<td>200 ppm TWA</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

**OSHA Vacated PELs:** cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

https://fscimage.fishersci.com/msds/97773.htm 12/7/2011
Section 9 - Physical and Chemical Properties

**Physical State:** Liquid  
**Appearance:** Clear  
**Odor:** Pleasant odor  
**pH:** Not available.  
**Vapor Pressure:** 201 mm Hg @ 25 deg C  
**Vapor Density:** 3.34 (air=1)  
**Evaporation Rate:** Not available.  
**Viscosity:** Not available.  
**Boiling Point:** 60 deg C @ 760 mm Hg  
**Freezing/Melting Point:** -80 deg C  
**Decomposition Temperature:** Not available.  
**Solubility:** Insoluble.  
**Specific Gravity/Density:** 1.2800  
**Molecular Formula:** C2H2Cl2  
**Molecular Weight:** 96.94

Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.  
**Conditions to Avoid:** Light, ignition sources, exposure to air, excess heat.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, strong bases, copper.  
**Hazardous Decomposition Products:** Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.  
**Hazardous Polymerization:** May occur.

Section 11 - Toxicological Information

**RTECS#:**  
**CAS# 156-59-2:** KV9420000  
**LD50/LC50:**  
**CAS# 156-59-2:**  
Inhalation, rat: LC50 = 13700 ppm;  

**Carcinogenicity:**  
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  

**Epidemiology:** No data available.  
**Teratogenicity:** No data available.  
**Reproductive Effects:** No data available.  
**Mutagenicity:** No data available.  
**Neurotoxicity:** No data available.  
**Other Studies:**

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

https://fscimage.fishersci.com/msds/97773.htm  
12/7/2011
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipping Name:</strong> DOT regulated - small quantity provisions apply (see 49CFR173.4)</td>
<td>1,2-DICHLOROETHYLENE</td>
</tr>
<tr>
<td><strong>Hazard Class:</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>UN Number:</strong> UN1150</td>
<td></td>
</tr>
<tr>
<td><strong>Packing Group:</strong> II</td>
<td></td>
</tr>
</tbody>
</table>

### Section 15 - Regulatory Information

**US FEDERAL**

- **TSCA**
  - CAS# 156-59-2 is listed on the TSCA inventory.
- **Health & Safety Reporting List**
  - None of the chemicals are on the Health & Safety Reporting List.
- **Chemical Test Rules**
  - None of the chemicals in this product are under a Chemical Test Rule.
- **Section 12b**
  - None of the chemicals are listed under TSCA Section 12b.
- **TSCA Significant New Use Rule**
  - None of the chemicals in this material have a SNUR under TSCA.
- **CERCLA Hazardous Substances and corresponding RQs**
  - None of the chemicals in this material have an RQ.
- **SARA Section 302 Extremely Hazardous Substances**
  - None of the chemicals in this product have a TPQ.
- **Section 313**
  - No chemicals are reportable under Section 313.
- **Clean Air Act:**
  - This material does not contain any hazardous air pollutants.
  - This material does not contain any Class 1 Ozone depleters.
  - This material does not contain any Class 2 Ozone depleters.
- **Clean Water Act:**
  - None of the chemicals in this product are listed as Hazardous Substances under the CWA.
  - None of the chemicals in this product are listed as Priority Pollutants under the CWA.
  - None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
- **OSHA:**
  - None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

- CAS# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

- XN F

**Risk Phrases:**

https://fscimage.fishersci.com/msds/97773.htm

12/7/2011
R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse
effects in the aquatic environment.

**Safety Phrases:**
- S 16 Keep away from sources of ignition - No smoking.
- S 29 Do not empty into drains.
- S 7 Keep container tightly closed.
- S 61 Avoid release to the environment. Refer to special instructions/
safety data sheets.

**WGK (Water Danger/Protection)**
- CAS# 156-59-2: No information available.

**Canada - DSL/NDSL**
- CAS# 156-59-2 is listed on Canada's NDSL List.

**Canada - WHMIS**
- WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 2/09/1998  
**Revision #5 Date:** 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, however arising, even if Fisher has been advised of the possibility of such damages.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: cis-1,3-Dichloropropene
Product Number: 377414
Brand: Aldrich
Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer): (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Toxic by ingestion, Harmful by skin absorption., Skin sensitiser, Irritant

Target Organs
Liver, Kidney

GHS Classification
Flammable liquids (Category 3)
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Dermal (Category 4)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Skin sensitization (Category 1)
Specific target organ toxicity - single exposure (Category 3)
Aspiration hazard (Category 1)
Acute aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Signal word: Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H301 Toxic if swallowed.
H304 May be fatal if swallowed and enters airways.
H312 + H332 Harmful in contact with skin or if inhaled.
H315 Causes skin irritation
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331 Do NOT induce vomiting

HMIS Classification
Health hazard: 2
Flammability: 3
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 3
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Toxic if swallowed. Aspiration hazard if swallowed - can enter lungs and cause damage.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C₃H₄Cl₂
Molecular Weight: 110.97 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
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<tbody>
<tr>
<td>(Z)-1,3-Dichloropropene</td>
<td>10061-01-5</td>
<td>233-195-8</td>
<td>602-030-00-5</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour no data available

Safety data
pH no data available
Melting point/freezing point no data available
Boiling point 104 °C (219 °F) - lit.
Flash point 23.9 °C (75.0 °F) - closed cup
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density 1.225 g/cm³ at 25 °C (77 °F)
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
Odour no data available
Odour Threshold no data available
Evaporation rate no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Aluminum, strong oxidizing agents, Metals, Halogens

Hazardous decomposition products
Other decomposition products - no data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
Oral LD50 no data available
Inhalation LC50
Dermal LD50
Other information on acute toxicity
Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
May cause sensitization by skin contact.

The preceding data, or interpretation of data, was determined using Quantitative Structure Activity Relationship (QSAR) modeling.

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
The substance or mixture is known to cause human aspiration toxicity hazards or has to be regarded as if it causes a human aspiration toxicity hazard.

Potential health effects

Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.

Ingestion: Toxic if swallowed. Aspiration hazard if swallowed - can enter lungs and cause damage.

Skin: Causes skin irritation.

Eye: Causes ocular irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**
no data available

**Additional Information**
RTECS: UC8325000

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**
no data available

**Persistence and degradability**
no data available

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

---

**13. DISPOSAL CONSIDERATIONS**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**DOT (US)**
UN number: 2047 Class: 3 Packing group: II
Proper shipping name: Dichloropropenes
Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

**IMDG**
UN number: 2047 Class: 3 Packing group: II FMS-No: F-F, S-D
Proper shipping name: DICHLOROPROPENES
Marine pollutant: No

**IATA**
UN number: 2047 Class: 3 Packing group: II
Proper shipping name: Dichloropropenes

---

**15. REGULATORY INFORMATION**

**OSHA Hazards**
Flammable liquid, Toxic by ingestion, Harmful by skin absorption., Skin sensitisers, Irritant

**SARA 302 Components**
SARA 302. No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

(Z)-1,3-Dichloropropene

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>10001-01-5</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

(Z)-1,3-Dichloropropene

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>10061-01-5</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

(Z)-1,3-Dichloropropene

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>10061-01-5</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Dibromochloromethane
Product Number : 206326
Brand : Aldrich
Company : Sigma-Aldrich
          3050 Spruce Street
          SAINT LOUIS MO  63103
          USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.

Precautionary statement(s)
none

HMIS Classification
Health hazard: 2
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Chlorodibromomethane

Formula : CHBr\textsubscript{2}Cl
Molecular Weight : 208.28 g/mol
4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleanup
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Recommended storage temperature: 2 - 8 °C

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid, clear
Colour light yellow

Safety data
PH no data available
Melting point -22 °C (-8 °F) - lit.
Boiling point 119 - 120 °C (246 - 248 °F) at 997 hPa (748 mmHg) - lit.
Flash point no data available
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Density 2.451 g/cm3 at 25 °C (77 °F)
Water solubility no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong bases, Strong oxidizing agents, Magnesium

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas, Hydrogen bromide gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 370.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available
Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion Toxic if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Signs and Symptoms of Exposure
prolonged or repeated exposure can cause: Nausea, Dizziness, Headache, narcotic

Additional Information
RTECS: PA6360000

12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to fish LC50 - Cyprinus carpio (Carp) - 34 mg/l - 5 d

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available
13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3002 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (Dibromochloromethane)
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion

DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibromochloromethane</td>
<td>124-48-1</td>
</tr>
</tbody>
</table>

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibromochloromethane</td>
<td>124-48-1</td>
<td>2007-03-01</td>
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Pennsylvania Right To Know Components

<table>
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New Jersey Right To Know Components

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<td>2007-03-01</td>
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</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
## DIBROMOMETHANE

ICSC: 0354

Methylene bromide  
Methylene dibromide  
CH₂Br₂  
Molecular mass: 173.8

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible.</td>
<td></td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>SKIN</td>
<td>Dry skin. Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness.</td>
<td>Safety spectacles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>(Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Do NOT induce vomiting. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable, non-aluminium containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: A filter respirator for organic gases and vapours.

### STORAGE

Separated from food and feedstuffs. Ventilation along the floor.

### PACKAGING & LABELLING

- Xn symbol
- R: 20-52/53
- S: 2-24-61
- UN Hazard Class: 6.1
- UN Packing Group: III

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

SEE IMPORTANT INFORMATION ON BACK
**DIBROMOMETHANE**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID.</th>
<th>PHYSICAL DANGERS: The vapour is heavier than air.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL DANGERS: The substance decomposes on heating, on burning or on contact with hot surfaces producing toxic and irritating fumes including hydrogen bromide.</td>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV not established.</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Boiling point: 97°C</th>
<th>Vapour pressure, kPa at 20°C: 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point: -52.7°C</td>
<td>Relative vapour density (air = 1): 6.0</td>
</tr>
<tr>
<td>Relative density (water = 1): 2.5</td>
<td>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.25</td>
</tr>
<tr>
<td>Solubility in water, g/100 ml at 15°C: 1.2</td>
<td></td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL DATA**

Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response. Transport Emergency Card: TEC (R)-61GT1-III

**ADDITIONAL INFORMATION**

**ICSC: 0354**

(C) IPCS, CEC, 1994

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---

http://www.cdc.gov/niosh/ipcsneng/neng0354.html
**DICHLORODIFLUOROMETHANE**

**TYPES OF HAZARD/EXPOSURE**

<table>
<thead>
<tr>
<th></th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td>In case of fire: keep cylinder cool by spraying with water.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>INHALATION</strong></td>
<td>Cardiac arrhythmia. Confusion. Drowsiness. Unconsciousness.</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.</td>
</tr>
<tr>
<td>• <strong>SKIN</strong></td>
<td>ON CONTACT WITH LIQUID: FROSTBITE.</td>
<td>Cold-insulating gloves.</td>
<td>ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.</td>
</tr>
<tr>
<td>• <strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• <strong>INGESTION</strong></td>
<td></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Ventilation.

**STORAGE**

Separated from incompatible materials. See Chemical Dangers. Cool. Ventilation along the floor.

**PACKAGING & LABELLING**

Special insulated cylinder. UN Hazard Class: 2.2

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

**DICHLORODIFLUOROMETHANE**

---

International Chemical Safety Cards

http://www.cdc.gov/niosh/ipcsneng/neng0048.html

12/7/2011
**Physical state: appearance:**
Colorless compressed liquefied gas, with characteristic odour.

**Physical dangers:**
The gas is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

**Chemical dangers:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carbonyl fluoride ICSC 0633). Reacts violently with metals such as zinc and powdered aluminium. Attacks magnesium and its alloys.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 1000 ppm as TWA A4 (ACGIH 2001).
MAK: 1000 ppm; 5000 mg/m³; IV, C (DFG 2001).
OSHA PEL: TWA 1000 ppm (4950 mg/m³)
NIOSH REL: TWA 1000 ppm (4950 mg/m³)
NIOSH IDLH: 15,000 ppm See: [75718](https://www.cdc.gov/niosh/ipcsneng/neng0048.html)

**Routes of exposure:**
The substance can be absorbed into the body by inhalation.

**Inhalation risk:**
On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.

**Effects of short-term exposure:**
Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system, resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.

**Effects of long-term or repeated exposure:**

**Physical properties**
- Boiling point: -30°C
- Melting point: -158°C
- Relative density (water = 1): 1.5
- Solubility in water, g/100 ml at 20°C: 0.03
- Vapour pressure, kPa at 20°C: 568
- Relative vapour density (air = 1): 4.2
- Octanol/water partition coefficient as log Pow: 2.16

**Environmental data**
This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

**Notes**
High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Freon 12, Frigen 12, Halon 122 are trade names.

Transport Emergency Card: TEC (R)-20G2A

**ICSC: 0048**
Dichlorodifluoromethane

(C) IPCS, CEC, 1994

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# Ethylbenzene

**ICSC: 0268**

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0268</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>100-41-4</td>
</tr>
<tr>
<td>RTECS #</td>
<td>DA0700000</td>
</tr>
<tr>
<td>UN #</td>
<td>1175</td>
</tr>
<tr>
<td>EC #</td>
<td>601-023-00-4</td>
</tr>
<tr>
<td>Validated</td>
<td>March 13, 1995</td>
</tr>
</tbody>
</table>

**Ethylbenzol**  
**Phenylethane**  
**EB**  
**C₈H₁₀ / C₆H₅C₂H₅**  
**Molecular mass: 106.2**

## Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Highly flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Vapour/air mixtures are explosive.</td>
<td>Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

## Exposure

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Prevent Generation of Mist!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SKIN</strong></td>
<td>Dry skin. Redness.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>(Further see Inhalation). Do not eat, drink, or smoke during work.</td>
</tr>
</tbody>
</table>

## Spillage Disposal


## Storage

Fireproof. Separated from strong oxidants.

## Packaging & Labelling

- **F symbol**
- **Xn symbol**
- **R:** 11-20  
- **S:** 2-16-24/25-29  
- **UN Hazard Class:** 3  
- **UN Packing Group:** II

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**ETHYLBENZENE**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH AROMATIC ODOUR.

**PHYSICAL DANGERS:**
The vapour mixes well with air, explosive mixtures are easily formed.

**CHEMICAL DANGERS:**
Reacts with strong oxidants. Attacks plastic and rubber.

**PHYSICAL PROPERTIES**
- Boiling point: 136°C
- Melting point: -95°C
- Relative density (water = 1): 0.9
- Solubility in water, g/100 ml at 20°C: 0.015
- Vapour pressure, kPa at 20°C: 0.9
- Relative vapour density (air = 1): 3.7

**ENVIRONMENTAL DATA**
The substance is harmful to aquatic organisms.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

**CHEMICAL DANGERS:**
Reacts with strong oxidants. Attacks plastic and rubber.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: 100 ppm as TWA 125 ppm as STEL
- MAK: skin absorption (H);
- Carcinogen category: 3A;
- OSHA PEL: TWA 100 ppm (435 mg/m³) NIOSH REL: TWA 100 ppm (435 mg/m³) ST 125 ppm (545 mg/m³) NIOSH IDLH: 800 ppm 10%LEL See: 100414

**ENVIRONMENTAL DATA**
The substance is harmful to aquatic organisms.

**RECOMMENDATIONS FOR HANDLING AND STORAGE:**
- Keep container tightly closed.
- Store in a cool, dry, ventilated area.
- Keep away from heat, sparks, and flame.
- Keep away from sources of ignition.
- Do not breathe dust or fumes.
- Do not inhale vapours.
- Do not get on skin or eyes.
- Avoid contact with skin and eyes.

**ADDITIONAL INFORMATION**
- ICSC: 0268
- ETHYLBENZENE

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# International Chemical Safety Cards

## HEXACHLOROBUTADIENE

ICSC: 0896

**1,1,2,3,4,4-Hexachloro-1,3-butadiene**  
Perchlorobutadiene  
*C₄Cl₆ / CCl₂=CCICCl=CCl₂*  
Molecular mass: 260.8

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0896</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>87-68-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>EJ0700000</td>
</tr>
<tr>
<td>UN #</td>
<td>2279</td>
</tr>
</tbody>
</table>

August 10, 1997 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACUTE HAZARDS/SYMPTOMS</strong></td>
<td><strong>PREVENTION</strong></td>
</tr>
<tr>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Avoid all contact!</td>
</tr>
<tr>
<td>Burning sensation. Cough. Sore throat. Symptoms may be delayed (see Notes). Coma.</td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Pain. Redness. Severe deep burns. Loss of vision.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Burning sensation. Abdominal pain. Shock or collapse.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: complete protective clothing including self-contained breathing apparatus).

### STORAGE

Separated from food and feedstuffs. Well closed. Ventilation along the floor. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs. Severe marine pollutant.  
UN Hazard Class: 6.1  
UN Packing Group: III

### SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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http://www.cdc.gov/niosh/ipcsneng/neng0896.html
**HEXACHLOROBUTADIENE**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>N</th>
<th>T</th>
<th>D</th>
<th>A</th>
<th>T</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE; APPEARANCE:</strong></td>
<td>COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>PHYSICAL DANGERS:</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CHEMICAL DANGERS:</strong></td>
<td>The substance decomposes on burning producing toxic and corrosive fumes including hydrogen chloride and phosgene. Attacks rubber and some forms of plastic.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></td>
<td>TLV (as TWA): 0.02 ppm; 0.21 mg/m³ A3 (skin) (ACGIH 1997), MAK: skin absorption (H); Carcinogen category: 3B (DFG 2008), OSHA PEL: none</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NIOSH REL: Ca TWA 0.02 ppm (0.24 mg/m³) skin <strong>See Appendix A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>NIOSH IDLH: Ca N.D. See: <strong>IDLH INDEX</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 212°C
- Melting point: -18°C
- Relative density (water = 1): 1.68
- Solubility in water: none
- Vapour pressure, Pa at 20°C: 20
- Relative vapour density (air = 1): 9.0
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00
- Flash point: 90°C
- Auto-ignition temperature: 610°C
- Octanol/water partition coefficient as log Pow: 4.90

**ENVIRONMENTAL DATA**

The substance is toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish. The substance may cause long-term effects in the aquatic environment.

**NOTES**

- Transport Emergency Card: TEC (R)-613
- NFPA Code: H2; F1; R1;
- Card has been partially updated in November 2008: see Occupational Exposure Limits,

**ADDITIONAL INFORMATION**

**ICSC: 0896**

(C) IPCS, CEC, 1994

**HEXACHLOROBUTADIENE**

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### CUMENE

ICSC: 0170

(1-Methylethyl)benzene
2-Phenylpropane
Isopropylbenzene
C\(_9\)H\(_{12}\) / C\(_6\)H\(_5\)CH(CH\(_3\))\(_2\)
Molecular mass: 120.2

ICSC # 0170
CAS # 98-82-8
RTECS # GR8575000
UN # 1918
EC # 601-024-00-X
April 13, 2000 Peer reviewed

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 31°C explosive vapour/air mixtures may be formed.</td>
<td>Above 31°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

### EXPOSURE

| SKIN | Dry skin. | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| EYES | Redness. Pain. | Safety spectacles. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| INGESTION | (See Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Do NOT induce vomiting. Refer for medical attention. |

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.

### STORAGE


### PACKAGING & LABELLING

Marine pollutant.
Note: C
Xn symbol
N symbol
R: 10-37-51/53-65
S: 2-24-37-61-62
UN Hazard Class: 3
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

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### International Chemical Safety Cards

**CUMENE**

<table>
<thead>
<tr>
<th><strong>I</strong></th>
<th><strong>M</strong></th>
<th><strong>P</strong></th>
<th><strong>O</strong></th>
<th><strong>R</strong></th>
<th><strong>T</strong></th>
<th><strong>A</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE; APPEARANCE:</strong></td>
<td>COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</td>
<td><strong>PHYSICAL DANGERS:</strong></td>
<td>As a result of flow, agitation, etc., electrostatic charges can be generated.</td>
<td><strong>CHEMICAL DANGERS:</strong></td>
<td>Reacts violently with acids and strong oxidants causing fire and explosion hazard. The substance can form explosive peroxides.</td>
<td><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>TLV:</strong> 50 ppm as TWA (ACGIH 2004). <strong>MAK:</strong> 50 ppm 250 mg/m³ <strong>Peak limitation category:</strong> II(4); <strong>skin absorption (H);</strong> <strong>Pregnancy risk group:</strong> C; (DFG 2004). <strong>OSHA PEL:</strong> TWA 50 ppm (245 mg/m³) skin <strong>NIOSH REL:</strong> TWA 50 ppm (245 mg/m³) skin <strong>NIOSH IDLH:</strong> 900 ppm 10%LEL See: 98828</td>
</tr>
<tr>
<td><strong>PHYSICAL PROPERTIES</strong></td>
<td>Boiling point: 152°C</td>
<td>Melting point: -96°C</td>
<td>Relative density (water = 1): 0.90</td>
<td>Solubility in water: none</td>
<td>Vapour pressure, Pa at 20°C: 427</td>
<td>Relative vapour density (air = 1): 4.2</td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL DATA</strong></td>
<td>The substance is toxic to aquatic organisms.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01</td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
<td>Check for peroxides prior to distillation; eliminate if found.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Flash point: 31°C c.c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Auto-ignition temperature: 420°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Explosive limits, vol% in air: 0.9-6.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Octanol/water partition coefficient as log Pow: 3.66</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**

**ICSC: 0170**

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**METHYL TERT-BUTYL ETHER**

ICSC: 1164

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly flammable.</td>
<td>NO open flames, NO sparks, and NO smoking. NO contact with oxidants.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
</tbody>
</table>

| EXPLOSION | Vapour/air mixtures are explosive. | Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. | In case of fire: keep drums, etc., cool by spraying with water. |

<table>
<thead>
<tr>
<th>EXPOSURE</th>
</tr>
</thead>
</table>


| SKIN | Dry skin. Redness. | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |

| EYES | Redness. | Safety goggles or face shield. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |


<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: filter respirator for organic gases and vapours.</td>
<td>Fireproof. Separated from strong oxidants, strong acids.</td>
<td>F symbol</td>
</tr>
</tbody>
</table>

**SEE IMPORTANT INFORMATION ON BACK**
INTERNATIONAL CHEMICAL SAFETY CARDS

METHYL TERT-BUTYL ETHER

ICSC: 1164

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire hazard. The substance decomposes on contact with acids.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; A3; (ACGIH 2004).
MAK: 50 ppm, 180 mg/m³; Peak limitation category: I(1.5); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the skin. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure far above the OEL could cause lowering of consciousness.

PHYSICAL PROPERTIES
Boiling point: 55°C
Melting point: -109°C
Relative density (water = 1): 0.7
Solubility in water, g/100 ml at 20°C: 4.2
Vapour pressure, kPa at 20°C: 27
Relative vapour density (air = 1): 3.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.5
Flash point:
-28°C c.c.
Auto-ignition temperature: 375°C
Explosive limits, vol% in air: 1.6-15.1
Octanol/water partition coefficient as log Pow: 1.06

ENVIRONMENTAL DATA
It is strongly advised not to let the chemical enter into the environment because it persists in the environment.

NOTES
Much less likely to form peroxides than other ethers. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-30GF1-I+II

ADDITIONAL INFORMATION

ICSC: 1164

METHYL TERT-BUTYL ETHER

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http://www.cdc.gov/niosh/ipcsneng/neng1164.html
# International Chemical Safety Cards

## DICHLOROMETHANE

### Chemical Details
- **ICSC #**: 0058
- **CAS #**: 75-09-2
- **RTECS #**: PA8050000
- **UN #**: 1593
- **EC #**: 602-004-00-3
- **Molecular mass**: 84.9

### Types of Hazard/Exposure
<table>
<thead>
<tr>
<th>Exposures</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Risk of fire and explosion (see Chemical Dangers).</td>
<td>Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>Prevent generation of mists! Strict hygiene!</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain. Severe deep burns.</td>
<td>Safety goggles, face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.</td>
</tr>
</tbody>
</table>

### Spillage Disposal
- Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

### Storage
- Separated from metals (see Chemical Dangers), food and feedstuffs. Cool. Ventilation along the floor.

### Packaging & Labelling
- Do not transport with food and feedstuffs.
- Xn symbol: R: 40
- S: (2-)23-24/25-36/37
- UN Hazard Class: 6.1
- UN Packing Group: III

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*Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.*

[Read full document](http://www.cdc.gov/niosh/ipcsneng/neng0058.html)
## DICHLOROMETHANE

### PHYSICAL STATE; APPEARANCE:
**COLOURLESS LIQUID**, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

### CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes. Reacts violently with metals such as aluminium powder and magnesium powder, strong bases and strong oxidants causing fire and explosion hazard. Attacks some forms of plastic rubber and coatings.

### OCCUPATIONAL EXPOSURE LIMITS:
- **TLV**: 50 ppm as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
- **MAK**:
  - Carcinogen category: 3A; (DFG 2004).
- **OSHA PEL**:
  - 1910.1052 TWA 25 ppm ST 125 ppm
- **NIOSH REL**:
  - Ca See Appendix A
- **NIOSH IDLH**:
  - Ca 2300 ppm See: 75092

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

### INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin and the respiratory tract. Exposure could cause lowering of consciousness. Exposure could cause the formation of methaemoglobin.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES
- **Boiling point**: 40°C
- **Melting point**: -95.1°C
- **Relative density** (water = 1):
  - 1.3
- **Solubility in water, g/100 ml at 20°C**: 1.3
- **Vapour pressure, kPa at 20°C**: 47.4
- **Relative vapour density** (air = 1):
  - 2.9
- **Relative density of the vapour/air-mixture at 20°C** (air = 1):
  - 1.9
- **Auto-ignition temperature**: 556°C
- **Explosive limits, vol% in air**: 12-25
- **Octanol/water partition coefficient as log Pow**: 1.25

### ENVIRONMENTAL DATA:
This substance may be hazardous in the environment; special attention should be given to ground water contamination.

### NOTES
Addition of small amounts of a flammable substance or an increase in the oxygen content of the air strongly enhances combustibility. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. R30 is a trade name. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1593

NFPA Code: H2; F1; R0;

**ADDITIONAL INFORMATION**

**ICSC: 0058**

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http://www.cdc.gov/niosh/ipcsneng/neng0058.html

12/7/2011
modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# NAPHTHALENE

ICSC: 0667

| Molecular mass: 128.18 |

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0667</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>91-20-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>QJ0525000</td>
</tr>
<tr>
<td>UN #</td>
<td>1334 (solid); 2304 (molten)</td>
</tr>
<tr>
<td>EC #</td>
<td>601-052-00-2</td>
</tr>
<tr>
<td>April 21, 2005 Validated</td>
<td></td>
</tr>
</tbody>
</table>

## TYPES OF HAZARD/EXPOSURE

### ACUTE HAZARDS/SYMPOTMS

### PREVENTION

### FIRST AID/FIRE FIGHTING

#### FIRE

Combustible.

NO open flames.

Powder, water spray, foam, carbon dioxide.

#### EXPLOSION

Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.

Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.

#### EXPOSURE

PREVENT DISPERSION OF DUST!

#### INHALATION


Ventilation (not if powder), local exhaust, or breathing protection.

Fresh air, rest. Refer for medical attention.

#### SKIN

MAY BE ABSORBED! (Further see Inhalation).

Protective gloves.

Rinse skin with plenty of water or shower.

#### EYES

Safety spectacles.

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

#### INGESTION


Do not eat, drink, or smoke during work. Wash hands before eating.

Rest. Refer for medical attention.

## SPILLAGE DISPOSAL

Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access.

## STORAGE

Do not transport with food and feedstuffs. Marine pollutant.

Xn symbol

N symbol

R: 22-40-50/53

S: 2-36/37-46-60-61

UN Hazard Class: 4.1

UN Packing Group: III

## PACKAGING & LABELLING

## SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

http://www.cdc.gov/niosh/ipcsneng/neng0667.html

12/7/2011
# International Chemical Safety Cards

## NAPHTHALENE

**ICSC:** 0667

### PHYSICAL STATE; APPEARANCE:

White solid in various forms, with characteristic odour.

### PHYSICAL DANGERS:

Dust explosion possible if in powder or granular form, mixed with air.

### CHEMICAL DANGERS:

On combustion, forms irritating and toxic gases. Reacts with strong oxidants.

### OCCUPATIONAL EXPOSURE LIMITS:

- **TLV:** 10 ppm as TWA; 15 ppm as STEL; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2005).
- **MAK:** skin absorption (H);
- **Carcinogen category:** 2; Germ cell mutagen group: 3B; (DFG 2004).
- **OSHA PEL:** TWA 10 ppm (50 mg/m³)
- **NIOSH REL:** TWA 10 ppm (50 mg/m³) ST 15 ppm (75 mg/m³)
- **NIOSH IDLH:** 250 ppm See: 91203

### ROUTES OF EXPOSURE:

The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

### INHALATION RISK:

A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.

### EFFECTS OF SHORT-TERM EXPOSURE:

The substance may cause effects on the blood, resulting in lesions of blood cells (haemolysis). See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

The substance may have effects on the blood, resulting in chronic haemolytic anaemia. The substance may have effects on the eyes, resulting in the development of cataract. This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES

- Boiling point: 218°C
- Sublimation slowly at room temperature
- Melting point: 80°C
- Density: 1.16 g/cm³
- Solubility in water, g/100 ml at 25°C: none
- Vapour pressure, Pa at 25°C: 11
- Relative vapour density (air = 1): 4.42
- Flash point: 80°C c.c.
- Auto-ignition temperature: 540°C
- Explosive limits, vol% in air: 0.9-5.9
- Octanol/water partition coefficient as log Pow: 3.3

### ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

### NOTES

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)

NFPA Code: H2; F2; R0;

### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>ICSC: 0667</th>
</tr>
</thead>
</table>

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http://www.cdc.gov/niosh/ipcsneng/neng0667.html
Material Safety Data Sheet
Normal-Butylbenzene, 99+%

ACC# 55434

Section 1 - Chemical Product and Company Identification

MSDS Name: Normal-Butylbenzene, 99+%  
Catalog Numbers: AC107850000, AC107850050, AC107850250, AC107850500, AC107851000, AC107852500  
Synonyms: 1-Phenylbutane  
Company Identification:  
Acros Organics N.V.  
One Reagent Lane  
Fair Lawn, NJ 07410  
For information in North America, call: 800-ACROS-01  
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-51-8</td>
<td>n-Butylbenzene</td>
<td>&gt;99</td>
<td>203-209-7</td>
</tr>
</tbody>
</table>

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 59 deg C.  
Warning! Flammable liquid and vapor. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. The toxicological properties of this material have not been fully investigated.  
Target Organs: Liver, nervous system.

Potential Health Effects  
Eye: May cause eye irritation. The toxicological properties of this material have not been fully investigated.  
Skin: May cause skin irritation. The toxicological properties of this material have not been fully investigated.  
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. The toxicological properties of this substance have not been fully investigated.  
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. Vapors may cause dizziness or suffocation.  
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.  
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.  
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.  
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.  
Notes to Physician: Treat symptomatically and supportively.
Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Use agent most appropriate to extinguish fire. Do NOT use straight streams of water.

Flash Point: 59 deg C (138.20 deg F)
Autoignition Temperature: 412 deg C (773.60 deg F)
Explosion Limits, Lower: 0.80 vol %
Upper: 5.80 vol %
NFPA Rating: (estimated) Health: 1; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butylbenzene</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: n-Butylbenzene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions. Follow the OSHA respirator regulations found in 29
Physical State: Liquid
Appearance: clear, colorless
Odor: None reported.
pH: Not available.
Vapor Pressure: 1.33 hPa @ 23 C
Vapor Density: 4.6
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 183 deg C @ 760.00mm Hg
Freezing/Melting Point: -88 deg C
Decomposition Temperature: > 183 deg C
Solubility: insoluble
Specific Gravity/Density: 0.8600g/cm3
Molecular Formula: C10H14
Molecular Weight: 134.22

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat, strong oxidants.
Incompatibilities with Other Materials: Oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Carcinogenicity:
CAS# 104-51-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Ecotoxicity: No data available. No information available.
Environmental: Rapidly volatilizes into the atmosphere where it is photochemically degraded by hydroxyl radicals.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

<table>
<thead>
<tr>
<th>US DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name: BUTYL BENZENES</td>
<td>No information available.</td>
</tr>
<tr>
<td>Hazard Class: 3</td>
<td></td>
</tr>
<tr>
<td>UN Number: UN2709</td>
<td></td>
</tr>
<tr>
<td>Packing Group: III</td>
<td></td>
</tr>
</tbody>
</table>

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 104-51-8 is listed on the TSCA inventory.

Health & Safety Reporting List
CAS# 104-51-8: Effective 6/1/87, Sunset 12/19/95

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.

SARA Codes
CAS# 104-51-8: immediate, fire.

Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
CAS# 104-51-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

California Prop 65
California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**
Not available.

**Risk Phrases:**
- R 10 Flammable.

**Safety Phrases:**
- S 16 Keep away from sources of ignition - No smoking.
- S 24/25 Avoid contact with skin and eyes.
- S 33 Take precautionary measures against static discharges.
- S 37 Wear suitable gloves.
- S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
- S 9 Keep container in a well-ventilated place.
- S 28A After contact with skin, wash immediately with plenty of water.

**WGK (Water Danger/Protection)**
- CAS# 104-51-8: 1

**Canada - DSL/NDSL**
- CAS# 104-51-8 is listed on Canada's DSL List.

**Canada - WHMIS**
This product has a WHMIS classification of B3, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

---

**Section 16 - Additional Information**

**MSDS Creation Date:** 4/15/1998

**Revision #4 Date:** 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Propylbenzene
Product Number : P52407
Brand : Aldrich
Company : Sigma-Aldrich
            3050 Spruce Street
            SAINT LOUIS MO  63103
            USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Combustible Liquid

Target Organs
Lungs, Eyes, Kidney

GHS Label elements, including precautionary statements

Pictogram

Signal word : Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H336 May cause respiratory irritation.
H401 Toxic to aquatic life.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P331 Do NOT induce vomiting.

HMIS Classification
Health hazard: 0
Chronic Health Hazard: *
Flammability: 2
Physical hazards: 0

NFPA Rating
Health hazard: 1
Fire: 2
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Synonyms</th>
<th>1-Phenylpropane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>C₉H₁₂</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>120.19 g/mol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>103-65-1</td>
</tr>
<tr>
<td>EC-No.</td>
<td>203-132-9</td>
</tr>
<tr>
<td>Index-No.</td>
<td>601-021-00-X</td>
</tr>
<tr>
<td>Concentration</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

**Special protective equipment for fire-fighters**
Wear self-contained breathing apparatus for fire fighting if necessary.

**Further information**
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

---

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
For prolonged or repeated contact use protective gloves.

**Eye protection**
Face shield and safety glasses

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

<table>
<thead>
<tr>
<th>Form</th>
<th>liquid, clear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>colourless</td>
</tr>
</tbody>
</table>

**Safety data**

<table>
<thead>
<tr>
<th>pH</th>
<th>no data available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point</td>
<td>-99 °C (-146 °F) - lit.</td>
</tr>
<tr>
<td>Boiling point</td>
<td>159 °C (318 °F) - lit.</td>
</tr>
<tr>
<td>Flash point</td>
<td>42.0 °C (107.6 °F) - closed cup</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>450 °C (842 °F)</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>0.8 % (V)</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>6 % (V)</td>
</tr>
<tr>
<td>Density</td>
<td>0.862 g/cm3 at 25 °C (77 °F)</td>
</tr>
<tr>
<td>Water solubility</td>
<td>slightly soluble</td>
</tr>
</tbody>
</table>

---

### 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**Conditions to avoid**
Heat, flame and sparks.
Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 6.040 mg/kg
LC50 Inhalation - rat - 2 h - 65000 ppm

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Potential health effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Signs and Symptoms of Exposure
Damage to the lungs. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: DA8750000

12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 1.55 mg/l - 96.0 h
Toxicity to daphnia Immobilization EC50 - Daphnia magna (Water flea) - 2 mg/l - 24 h and other aquatic invertebrates.

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2364 Class: 3 Packing group: III
Proper shipping name: n-Propyl benzene
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2364 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: PROPYLEN (S)BENZENEN
Marine pollutant: No

IATA
UN-Number: 2364 Class: 3 Packing group: III
Proper shipping name: n-Propylbenzene

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard
Massachusetts Right To Know Components

Propylbenzene
CAS-No. 103-65-1
Revision Date 2007-03-01

Pennsylvania Right To Know Components

Propylbenzene
CAS-No. 103-65-1
Revision Date 2007-03-01

New Jersey Right To Know Components

Propylbenzene
CAS-No. 103-65-1
Revision Date 2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
## International Chemical Safety Cards

### o-Xylene

- **ICSC #:** 0084
- **CAS #:** 95-47-6
- **RTECS #:** ZE2450000
- **UN #:** 1307
- **EC #:** 601-022-00-9
- **Molecular mass:** 106.2

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 32°C explosive vapour/air mixtures may be formed.</td>
<td>Above 32°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td>STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!</td>
<td></td>
</tr>
<tr>
<td>SKIN</td>
<td>Dry skin. Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>Burning sensation. Abdominal pain. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Do NOT induce vomiting. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### Spillage Disposal

Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

### Storage

Fireproof. Separated from strong oxidants and strong acids.

### Packaging & Labelling

- Note: C
- Xn symbol
- R: 10-20/21-38
- S: 2-25
- UN Hazard Class: 3
- UN Packing Group: III

---

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the
International Chemical Safety Cards

o-XYLENE

ICSC: 0084

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts with strong acids and strong oxidants .

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 100 ppm as TWA; 150 ppm as STEL A4 (ACGIH 2001). BEI specified by (ACGIH 2001).
EU OEL: 50 ppm as TWA; 100 ppm as STEL (skin) (EU 2000).
OSHA PEL†: TWA 100 ppm (435 mg/m³)
NIOSH REL: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)
NIOSH IDLH: 900 ppm See: 95476

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the skin. The substance may cause effects on the central nervous system. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES
Boiling point: 144°C
Melting point: -25°C
Relative density (water = 1): 0.88
Solubility in water: none
Vapour pressure, kPa at 20°C: 0.7

RELATIVE VAPOUR DENSITY (AIR = 1): 3.7
RELATIVE DENSITY OF THE VAPOUR/AIR-MIXTURE AT 20°C (AIR = 1): 1.02
FLASH POINT: 32°C c.c.
AUTO-IGNITION TEMPERATURE: 463°C
EXPLOSIVE LIMITS, VOL% IN AIR: 0.9-6.7
OCTANOL/WATER PARTITION COEFFICIENT AS LOG POW: 3.12

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms.

NOTES
Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0086 p-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;
Card has been partially updated in January 2008: see Occupational Exposure Limits.

ADDITIONAL INFORMATION

ICSC: 0084
(C) IPCS, CEC, 1994

IMPORTANT LEGAL
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only
| NOTICE: | modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

[ICSC:NENG0084 International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH](http://www.cdc.gov/niosh/ipcsneng/neng0084.html)
**o-XYLENE**

ICSC: 0084

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
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<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 32°C explosive vapour/air mixtures may be formed.</td>
<td>Above 32°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

**EXPOSURE**

**INHALATION**
Ventilation, local exhaust, or breathing protection.
Fresh air, rest. Refer for medical attention.

**SKIN**
Dry skin. Redness.
Protective gloves.
Remove contaminated clothes. Rinse and then wash skin with water and soap.

**EYES**
Redness. Pain.
Safety spectacles.
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**INGESTION**
Burning sensation. Abdominal pain. (Further see Inhalation).
Do not eat, drink, or smoke during work.
Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

**SPILLAGE DISPOSAL**
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

**STORAGE**
Fireproof. Separated from strong oxidants strong acids

**PACKAGING & LABELLING**
Note: C
Xn symbol
R: 10-20/21-38
S: 2-25
UN Hazard Class: 3
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts with strong acids strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).
MAK: 100 ppm 440 mg/m³
Peak limitation category: II(2)
skin absorption (H);
Pregnancy risk group: D
(DFG 2005).
EU OEL: 50 ppm as TWA 100 ppm as STEL (skin)
(EU 2000).
OSHA PEL†: TWA 100 ppm (435 mg/m³)
NIOSH REL: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)
NIOSH IDLH: 900 ppm See: 95476

PHYSICAL PROPERTIES
Boiling point: 144°C
Melting point: -25°C
Relative density (water = 1): 0.88
Solubility in water:
none
Vapour pressure, kPa at 20°C: 0.7

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms.

NOTES
Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0086 p-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0084

o-XYLENE

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## p-XYLENE

### Chemical Information
- **Chemical Name:** para-Xylene, 1,4-Dimethylbenzene, p-Xylol
- **Chemical Formula:** C₆H₄(CH₃)₂ / C₈H₁₀
- **Molecular Mass:** 106.2

### Identification Numbers
- **ICSC #:** 0086
- **CAS #:** 106-42-3
- **RTECS #:** ZE2625000
- **UN #:** 1307
- **EC #:** 601-022-00-9

### Validation Information
- **August 03, 2002 Validated**

## Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>FIRE</th>
<th>EXPLOSION</th>
<th>EXPOSURE</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable.</td>
<td>Above 27°C explosive vapour/air mixtures may be formed.</td>
<td>STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

## Acute Hazards/Symptoms

### Inhalation
- Dizziness, Drowsiness, Headache, Nausea.
- Ventilation, local exhaust, or breathing protection.
- Fresh air, rest. Refer for medical attention.

### Skin
- Dry skin, Redness.
- Protective gloves.
- Remove contaminated clothes. Rinse and then wash skin with water and soap.

### Eyes
- Redness, Pain.
- Safety spectacles.
- First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

### Ingestion
- Burning sensation, Abdominal pain.
- (Further see Inhalation).
- Do not eat, drink, or smoke during work.
- Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

## Spillage Disposal
- Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

## Storage
- Fireproof. Separated from strong oxidants, strong acids

## Packaging & Labelling
- **UN Hazard Class:** 3
- **UN Packing Group:** III
- **Note:** C
- **Xn Symbol:** R: 10-20/21-38
- **S:** 2-25
- **UN Hazard Class:** 3
- **UN Packing Group:** III

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (© IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.**
**International Chemical Safety Cards**

**p-XYLENE**

**PHYSICAL STATE; APPEARANCE:**
Colourless liquid, with characteristic odour.

**PHYSICAL DANGERS:**
As a result of flow, agitation, etc., electrostatic charges can be generated.

**CHEMICAL DANGERS:**
Reacts with strong acids, strong oxidants.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).
MAK: 100 ppm 440 mg/m³
Peak limitation category: II(2)
skin absorption (H);
Pregnancy risk group: D (DFG 2005).
EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000).
OSHA PEL*: TWA 100 ppm (435 mg/m³)
NIOSH REL: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)
NIOSH IDLH: 900 ppm See: 95476

**PHYSICAL PROPERTIES**
- Boiling point: 138°C
- Melting point: 13°C
- Relative density (water = 1): 0.86
- Solubility in water: none
- Vapour pressure, kPa at 20°C: 0.9

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms.

**NOTES**
Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III
NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

**ICSC: 0086**
(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**
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### International Chemical Safety Cards

**m-XYLENE**

**ICSC: 0085**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 27°C explosive vapour/air mixtures may be formed.</td>
<td>Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

**EXPOSURE**

- **Skin**: Dry skin. Redness. Protective gloves. Remove contaminated clothes. Rinse and then wash skin with water and soap.
- **Eyes**: Redness. Pain. Safety spectacles. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
- **Ingestion**: Burning sensation. Abdominal pain. (Further see Inhalation). Do not eat, drink, or smoke during work. Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

**Spillage Disposal**

Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

**Storage**

Fireproof. Separated from strong oxidants strong acids

**Packaging & Labelling**

Note: C
Xn symbol
R: 10-20/21-38
S: 2-25
UN Hazard Class: 3
UN Packing Group: III

**See Important Information on Back**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (© IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
As a result of flow, agitation, etc., electrostatic charges can be generated.

**CHEMICAL DANGERS:**
Reacts with strong acids strong oxidants

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001).
MAK: 100 ppm 440 mg/m³
Peak limitation category: II(2)
skin absorption (H);
Pregnancy risk group: D (DFG 2005).
EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000).
OSHA PEL: TWA 100 ppm (435 mg/m³)
NIOSH REL: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)
NIOSH IDLH: 900 ppm See: 95476

**PHYSICAL PROPERTIES**
- Boiling point: 139°C
- Melting point: -48°C
- Relative density (water = 1): 0.86
- Solubility in water: none
- Vapour pressure, kPa at 20°C: 0.8
- Relative vapour density (air = 1): 3.7
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02
- Flash point: 27°C c.c.
- Auto-ignition temperature: 527°C
- Explosive limits, vol% in air: 1.1-7.0
- Octanol/water partition coefficient as log Pow: 3.20

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms.

**NOTES**
Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0086 p-Xylene.

NFPA Code: H 2; F 3; R 0;
Transport Emergency Card: TEC (R)-30S1307-III

**ADDITIONAL INFORMATION**

**IMPORTANT LEGAL NOTICE:**
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p-CYMENE

ICSC: 0617

1-Methyl-4-isopropylbenzene
Dolcymene
Camphogen
C\textsubscript{10}H\textsubscript{14} / CH\textsubscript{3}C\textsubscript{6}H\textsubscript{4}CH(CH\textsubscript{3})\textsubscript{2}
Molecular mass: 134.2

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 47°C explosive vapour/air mixtures may be formed.</td>
<td>Above 47°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>•SKIN</td>
<td>Dry skin. Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Wear protective gloves when administering first aid.</td>
</tr>
<tr>
<td>•EYES</td>
<td>Redness.</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. (Extra personal protection: filter respirator for organic gases and vapours).</td>
<td>Fireproof.</td>
<td>UN Hazard Class: 3 UN Packing Group: III</td>
</tr>
</tbody>
</table>

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

http://www.cdc.gov/niosh/ipcsneng/neng0617.html

12/7/2011
p-CYMENE

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air.

**CHEMICAL DANGERS:**
Reacts with oxidants. Attacks rubber.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.

**PHYSICAL PROPERTIES**
- Boiling point: 177°C
- Melting point: -68°C
- Relative density (water = 1): 0.85
- Solubility in water, g/100 ml at 25°C: 0.002
- Vapour pressure, Pa at 20°C: 200
- Relative vapour density (air = 1): 4.62
- Flash point: 47°C c.c.
- Auto-ignition temperature: 435°C
- Explosive limits, vol% in air: 0.7-5.6
- Octanol/water partition coefficient as log Pow: 4.1

**ENVIRONMENTAL DATA**

**NOTES**
Transport Emergency Card: TEC (R)-30G35
NFPA Code: H2; F2; R0;

**ADDITIONAL INFORMATION**

**ICSC: 0617 p-CYMENE**

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name: sec-Butylbenzene
Product Number: B90408
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Combustible Liquid, Irritant

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H226 Flammable liquid and vapour.
H315 + H320 Causes skin and eye irritation.
H401 Toxic to aquatic life.

Precautionary statement(s)
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification
Health hazard: 2
Flammability: 2
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 2
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: 2-Phenylbutane
Formula: $C_{10}H_{14}$
Molecular Weight: 134.22 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>135-98-8</td>
<td>205-227-0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.

**Eye protection**
Face shield and safety glasses

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- **Form**: liquid, clear
- **Colour**: colourless

**Safety data**
- **pH**: no data available
- **Melting point**: 75.5 °C (167.9 °F) - lit.
- **Boiling point**: 173 - 174 °C (343 - 345 °F) - lit.
- **Flash point**: 52.0 °C (125.6 °F) - closed cup
- **Ignition temperature**: 418 °C (784 °F)
- **Lower explosion limit**: 0.8 % (V)
- **Density**: 0.863 g/mL at 25 °C (77 °F)
- **Water solubility**: no data available

10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**Conditions to avoid**
Heat, flames and sparks.

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION
Acute toxicity
LD50 Dermal - rabbit -> 13,792 mg/kg

Skin corrosion/irritation
Skin - rabbit - irritating - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
No data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
No data available

Aspiration hazard
No data available

Potential health effects
Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion May be harmful if swallowed.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: CY9100000

12. ECOLOGICAL INFORMATION
Toxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

PBT and vPvB assessment
No data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2709  Class: 3  Packing group: III
Proper shipping name: Butyl benzenes
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2709  Class: 3  Packing group: III  EMS-No: F-E, S-D
Proper shipping name: BUTYLBENZENES
Marine pollutant: No

IATA
UN-Number: 2709  Class: 3  Packing group: III
Proper shipping name: Butylbenzenes

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Irritant

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

sec-Butylbenzene  CAS-No.  135-98-8

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components
sec-Butylbenzene  CAS-No.  135-98-8

New Jersey Right To Know Components
sec-Butylbenzene  CAS-No.  135-98-8

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION
Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
**International Chemical Safety Cards**

**STYRENE**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Dry powder. Foam. Carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 31°C explosive vapour/air mixtures may be formed. See Notes.</td>
<td>Above 31°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>STRICT HYGIENE!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>Redness. Pain.</td>
<td>Protective clothing. Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Remove all ignition sources. Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

**STORAGE**


**PACKAGING & LABELLING**

Airtight. Marine pollutant. Note: D Xn symbol R: 10-20-36/38 S: 2-23 UN Hazard Class: 3 UN Packing Group: III Signal: Danger Flame-Excl mark-Health haz Flammable liquid and vapour Harmful if inhaled vapour Causes skin irritation

http://www.cdc.gov/niosh/ipcsneng/neng0073.html

11/29/2011
ICSC: NENG0073 International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0073

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

STYRENE

ICSC: 0073

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW OILY LIQUID.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance can form explosive peroxides. The substance may polymerize due to warming, under the influence of light, oxidants oxygen, and peroxides, causing fire and explosion hazard. Reacts violently with strong acids, strong oxidants causing fire and explosion hazard. Attacks rubber, copper and copper alloys.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 20 ppm as TWA; 40 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued (ACGIH 2005).
MAK: 20 ppm, 86 mg/m³; Peak limitation category: II(2); Carcinogen category: 5; Pregnancy risk group: C; BAT issued; (DFG 2006).
OSHA PEL†: TWA 100 ppm C 200 ppm 600 ppm (5-minute maximum peak in any 3 hours)
NIOSH REL: TWA 50 ppm (215 mg/m³) ST 100 ppm (425 mg/m³)
NIOSH IDLH: 700 ppm See: 100425

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. This substance is possibly carcinogenic to humans. See Notes.

PHYSICAL PROPERTIES
Boiling point: 145°C
Melting point: -30.6°C
Relative density (water = 1): 0.91
Solubility in water, g/100 ml at 20°C: 0.03
Vapour pressure, kPa at 20°C: 0.67
Relative vapour density (air = 1): 3.6
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02
Flash point: 31°C c.c.
Auto-ignition temperature: 490°C
Explosive limits, vol% in air: 0.9-6.8
Octanol/water partition coefficient as log Pow: 3.0

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

NOTES
Depending on the degree of exposure, periodic medical examination is indicated. Check for peroxides prior to distillation; eliminate if found. Styrene monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-30S2055; 30GF1-III-9
NFPA Code: H 2; F 3; R 2;
Card has been partially updated in 2007: see Occupational Exposure Limits, Fire fighting.

<table>
<thead>
<tr>
<th>ICSC: 0073</th>
<th>STYRENE</th>
</tr>
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</table>

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: tert-Butylbenzene
Product Number: B90602
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: 2-Methyl-2-phenylpropane
Formula: C_{10}H_{14}
Molecular Weight: 134.22 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>96-06-6</td>
<td>202-632-4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable Liquid, Irritant

HMIS Classification
Health Hazard: 2
Flammability: 3
Physical hazards: 0

NFPA Rating
Health Hazard: 2
Fire: 3
Reactivity Hazard: 0

Potential Health Effects

Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.
Ingestion: May be harmful if swallowed.
4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point 34.0 °C (93.2 °F) - closed cup
Ignition temperature 450 °C (842 °F)

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods for cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g., sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.
8. EXPOSURE CONTROLS/PERSOMAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.

**Eye protection**
Face shield and safety glasses

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- **Form**: liquid, clear
- **Colour**: colourless

**Safety data**
- **pH**: no data available
- **Melting point**: -58 °C (-72 °F) - lit.
- **Boiling point**: 169 °C (336 °F) - lit.
- **Flash point**: 34.0 °C (93.2 °F) - closed cup
- **Ignition temperature**: 450 °C (842 °F)
- **Lower explosion limit**: 0.8 % (V)
- **Density**: 0.867 g/mL at 25 °C (77 °F)
- **Water solubility**: no data available
- **Partition coefficient**: log Pow: 3.80

10. STABILITY AND REACTIVITY

**Storage stability**
Stable under recommended storage conditions.

**Conditions to avoid**
Heat, flames and sparks.

**Materials to avoid**
Strong oxidizing agents
Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Hazardous reactions
Vapours may form explosive mixture with air.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 3,045 mg/kg

Irritation and corrosion
no data available

Sensitisation
no data available

Chronic exposure

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion May be harmful if swallowed.

Additional Information
RTECS: CY9120000

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)
no data available

Ecotoxicity effects

Toxicity to fish
LC0 - Leuciscus idus (Golden orfe) - 44 mg/l - 48 h
LC50 - Leuciscus idus (Golden orfe) - 65 mg/l - 48 h

Toxicity to daphnia and other aquatic
LC50 - Daphnia magna (Water flea) - 41 mg/l - 24 h
invertebrates.

Further information on ecology
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2709  Class: 3  Packing group: III
Proper shipping name: Butyl benzenes
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2709  Class: 3  Packing group: III  EMS-No: F-E, S-D
Proper shipping name: BUTYLBENZENES
Marine pollutant: No

IATA
UN-Number: 2709  Class: 3  Packing group: III
Proper shipping name: Butylbenzenes

15. REGULATORY INFORMATION

OSHA Hazards
Flammable Liquid, Irritant

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
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<tbody>
<tr>
<td>tert-Butylbenzene</td>
<td>98 06 6</td>
<td>1993 04 24</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butylbenzene</td>
<td>98-06-6</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>
New Jersey Right To Know Components

CAS-No. 98-06-6
Revision Date 1993-04-24

tert-Butylbenzene

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2009 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## TETRACHLOROETHYLENE

**ICSC: 0076**

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0076</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>127-18-4</td>
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<tr>
<td>RTECS #</td>
<td>KX3850000</td>
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<tr>
<td>UN #</td>
<td>1897</td>
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<tr>
<td>EC #</td>
<td>602-028-00-4</td>
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<tr>
<td>April 13, 2000 Validated</td>
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</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>Types of Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Dry skin. Redness.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles, face shield.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

<table>
<thead>
<tr>
<th>Spillage Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.</td>
</tr>
</tbody>
</table>

### STORAGE

<table>
<thead>
<tr>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separated from metals, (see Chemical Dangers), food and feedstuffs. Keep in the dark. Ventilation along the floor.</td>
</tr>
</tbody>
</table>

### PACKAGING & LABELLING

<table>
<thead>
<tr>
<th>Packaging &amp; Labelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not transport with food and feedstuffs. Marine pollutant.</td>
</tr>
<tr>
<td>Xn symbol</td>
</tr>
<tr>
<td>N symbol</td>
</tr>
<tr>
<td>R: 40-51/53</td>
</tr>
<tr>
<td>S: (2-)23-36/37-61</td>
</tr>
<tr>
<td>UN Hazard Class: 6.1</td>
</tr>
<tr>
<td>UN Packing Group: III</td>
</tr>
</tbody>
</table>

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B; (DFG 2004).
OSHA PEL: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
NIOSH IDLH: Ca 150 ppm See: 127184

**PHYSICAL PROPERTIES**
Boiling point: 121°C
Melting point: -22°C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20°C: 0.015
Vapour pressure, kPa at 20°C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

**NOTES**
Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

**ADDITIONAL INFORMATION**

**ICSC: 0076**

(C) IPCS, CEC, 1994
modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

**TOLUENE**

[Image of the NIOSH logo]

**Methylbenzene**
Toluol
Phenylmethane
C₆H₅CH₃ / C₇H₈
Molecular mass: 92.1

ICSC # 0078
CAS # 108-88-3
RTECS # XS5250000
UN # 1294
EC # 601-021-00-3
October 10, 2002 Peer reviewed

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Highly flammable.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Vapour/air mixtures are explosive.</td>
<td>Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td><strong>STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Dry skin. Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Burning sensation. Abdominal pain. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Do NOT induce vomiting. Refer for medical attention.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus

**STORAGE**
Fireproof. Separated from strong oxidants.

**PACKAGING & LABELLING**
F symbol
Xn symbol
S: 2-36/37-46-62
UN Hazard Class: 3
UN Packing Group: II
# International Chemical Safety Cards

## TOLUENE

### PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:
The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.

### CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire and explosion hazard.

### OCCUPATIONAL EXPOSURE LIMITS:
- **TLV**: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004).
- **MAK**: 50 ppm 190 mg/m³ H

- **OSHA PEL†**: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
- **NIOSH REL**: TWA 100 ppm (375 mg/m³) ST 150 ppm (560 mg/m³)
- **NIOSH IDLH**: 500 ppm See: [108883](#)

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

### INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

### PHYSICAL PROPERTIES
- Boiling point: 111°C
- Melting point: -95°C
- Relative density (water = 1): 0.87
- Solubility in water: none
- Vapour pressure, kPa at 25°C: 3.8
- Relative vapour density (air = 1): 3.1

### ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms.

### NOTES
Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1294
NFPA Code: H 2; F 3; R 0;

### ADDITIONAL INFORMATION

### ICSC: 0078

(C) IPCS, CEC, 1994
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : trans-1,2-Dichloroethene

Product Number : 48527
Brand : Supelco
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Harmful by ingestion., Irritant

Target Organs
Central nervous system, Liver, Kidney

GHS Classification
Flammable liquids (Category 2)
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Oral (Category 4)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Acute aquatic toxicity (Category 3)

GHS Label elements, including precautionary statements

Pictograms

Signal word : Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 + H332 Harmful if swallowed or if inhaled.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H402 Harmful to aquatic life.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
HMIS Classification
- Health hazard: 2
- Chronic Health Hazard: *
- Flammability: 3
- Physical hazards: 0

NFPA Rating
- Health hazard: 2
- Fire: 3
- Reactivity Hazard: 0

Potential Health Effects
- Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
- Skin: Harmful if absorbed through skin. Causes skin irritation.
- Eyes: Causes eye irritation.
- Ingestion: Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms:
- trans-1,2-Dichloroethene
- trans-1,2-Dichlороэтилен
- trans-Acetylene dichloride

Formula: C₂H₂Cl₂ C₂H₂Cl₂
Molecular Weight: 96.94 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
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<tbody>
<tr>
<td>156-60-5</td>
<td>205-860-2</td>
<td>602-026-00-3</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Carbon oxides, Phosgene gas
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Further information
Use water spray to cool unopened containers.
6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-Dichloroethylene</td>
<td>156-60-5</td>
<td>TWA</td>
<td>200 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks: Central Nervous System impairment Eye irritation

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid, clear
Colour light yellow

Safety data
pH no data available
Melting/freezing point Melting point/range: -50 °C (-58 °F)
Boiling point 48 °C (118 °F)
Flash point 6.0 °C (42.8 °F) - closed cup
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit 0.7 % (V)
Upper explosion limit 12.8 % (V)
Vapour pressure no data available
Density 1.257 g/mL at 25 °C (77 °F)
Water solubility no data available
Partition coefficient: n octanol/water no data available
Relative vapour density no data available
Odour no data available
Odour Threshold no data available
Evaporation rate no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Oxidizing agents, Bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Carbon oxides, Phosgene gas
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 1,235 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 24100 ppm

Dermal LD50
LD50 Dermal - rabbit - > 5,000 mg/kg
Remarks: Prolonged skin contact may cause skin irritation and/or dermatitis. Nutritional and Gross Metabolic: Weight loss or decreased weight gain.

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Teratogenicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion Harmful if swallowed.
Skin Harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.

Signs and Symptoms of Exposure
prolonged or repeated exposure can cause; narcosis. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to daphnia  EC50 - Daphnia magna (Water flea) - 220.00 mg/l - 48 h
and other aquatic invertebrates.

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

PBT and vPvB assessment
No data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1150  Class: 3  Packing group: II
Proper shipping name: 1,2-Dichloroethylene
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1150  Class: 3  Packing group: II  EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE
Marine pollutant: No

IATA
UN-Number: 1150  Class: 3  Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Harmful by ingestion., Irritant

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III. Section 302.
SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-Dichloroethylene</td>
<td>150-00-9</td>
<td>1993-04-24</td>
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Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-Dichloroethylene</td>
<td>156-60-5</td>
<td>1993-04-24</td>
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</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-Dichloroethylene</td>
<td>156-60-5</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: trans-1,3-Dichloropropene

Product Number: 47793
Brand: Supelco

Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone: +1 800-325-5832
Fax: +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer):
(314) 776-6555

Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Toxic by ingestion, Toxic by skin absorption, Skin sensitizer, Irritant, Carcinogen

Target Organs
Liver, Kidney

GHS Classification
Flammable liquids (Category 3)
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Dermal (Category 0)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Skin sensitization (Category 1)
Carcinogenicity (Category 2)
Specific target organ toxicity - single exposure (Category 3)
Aspiration hazard (Category 1)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H301 + H311 Toxic if swallowed or in contact with skin.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P200 Wear protective gloves/ protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.
P331 Do NOT induce vomiting.
P501 Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 3
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 3
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin Toxic if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Toxic if swallowed. Aspiration hazard if swallowed - can enter lungs and cause damage.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C\textsubscript{3}H\textsubscript{4}Cl\textsubscript{2} C\textsubscript{3}H\textsubscript{4}Cl\textsubscript{2}
Molecular Weight : 110.97 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>(E)-1,3-Undecanopropene</td>
<td>10061-02-6</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
5. FIRE-FIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: -20 °C

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- Form: liquid
- Colour: no data available

**Safety data**
- pH: no data available
- Melting point/freezing point: no data available
- Boiling point: 112.0 °C (233.6 °F)
- Flash point: 27 °C (81 °F) - closed cup
- Ignition temperature: no data available
- Autoignition temperature: no data available
- Lower explosion limit: no data available
- Upper explosion limit: no data available
- Vapour pressure: no data available
- Density: 1.23 g/cm3 at 20 °C (68 °F)
- Water solubility: no data available
- Partition coefficient: n-octanol/water: no data available
- Relative vapour density: no data available
- Odour: no data available
- Odour Threshold: no data available
- Evaporation rate: no data available

### 10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
Vapours may form explosive mixture with air.

**Conditions to avoid**
Heat, flames and sparks.

**Materials to avoid**
Aluminum, Strong oxidizing agents, Metals, Halogens

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

### 11. TOXICOLOGICAL INFORMATION
Acute toxicity

**Oral LD50**
no data available

**Inhalation LC50**
no data available

**Dermal LD50**
no data available

**Other information on acute toxicity**
no data available

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
May cause sensitization by skin contact.

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or CPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
May cause respiratory irritation.
Specific target organ toxicity - repeated exposure (Globally Harmonized System)
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Potential health effects

Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion: Toxic if swallowed. Aspiration hazard if swallowed - can enter lungs and cause damage.
Skin: Toxic if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
No data available

Additional Information
RTECS: UC8320000

12. ECOLOGICAL INFORMATION

Toxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

PBT and vPvB assessment
No data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.
No data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2047  Class: 3  Packing group: II
Proper shipping name: Dichloropropanes
Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2047  Class: 3  Packing group: II  EMS-No: F-E, S-D
Proper shipping name: DICHLOROPROPENES
15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Toxic by ingestion, Toxic by skin absorption, Skin sensitizer, Irritant, Carcinogen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>(E)-1,3-Dichloropropene</td>
<td>10061-02-6</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
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<th>Revision Date</th>
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</thead>
<tbody>
<tr>
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Pennsylvania Right To Know Components

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<th>Revision Date</th>
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</thead>
<tbody>
<tr>
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<td>10061-02-6</td>
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</tbody>
</table>

New Jersey Right To Know Components

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<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>(E)-1,3-Dichloropropene</td>
<td>10061-02-6</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# TRICHLOROETHYLENE

ICSC: 0081

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td></td>
<td>In case of fire in the surroundings: all extinguishing agents allowed.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>PREVENT GENERATION OF MISTS! STRICT HYGIENE!</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Dry skin. Redness.</td>
<td>Protective gloves. Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety spectacles, or eye protection in combination with breathing protection. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Ventilation. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.

**STORAGE**

Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs. Dry. Keep in the dark. Ventilation along the floor. Store in an area without drain or sewer access.

**PACKAGING & LABELLING**


Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

[http://www.cdc.gov/niosh/ipcsneng/neng0081.html](http://www.cdc.gov/niosh/ipcsneng/neng0081.html)
TRICHLOROETHYLENE

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene, hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene, which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).

**MAK:**
Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2007).

**OSHA PEL†:**
TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)

**NIOSH REL:**
Ca See Appendix A See Appendix C

**NIOSH IDLH:**
Ca 1000 ppm See: 79016

**ROUTEs OF EXPOSURE:**
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes and the skin. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system, resulting in respiratory failure. Exposure could cause lowering of consciousness.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system, resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

**PHYSICAL PROPERTIES**
- Boiling point: 87°C
- Melting point: -73°C
- Relative density (water = 1): 1.5
- Solubility in water, g/100 ml at 20°C: 0.1
- Vapour pressure, kPa at 20°C: 7.8
- Relative vapour pressure (air = 1): 4.5
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3
- Auto-ignition temperature: 410°C
- Explosive limits, vol% in air: 8-10.5
- Octanol/water partition coefficient as log Pow: 2.42
- Electrical conductivity: 800pS/m

**ENVIRONMENTAL DATA**
The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

**NOTES**
Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-61S1710

NFPA Code: H2; F1; R0;

Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response.
Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.
| IMPORTANT LEGAL NOTICE: | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |
International Chemical Safety Cards

TRICHLOROFLUOROMETHANE

ICSC: 0047

Trichloromonofluoromethane
Fluorotrichloromethane
CFC 11
R 11
CCl₃F
Molecular mass: 137.4

ICSC # 0047
CAS # 75-69-4
RTECS # PB6125000
July 03, 2002 Validated

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
<td></td>
</tr>
</tbody>
</table>

EXPOSURE

• INHALATION
  Ventilation, local exhaust, or breathing protection.
  Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

• SKIN
  ON CONTACT WITH LIQUID: FROSTBITE. Dry skin.
  Cold-insulating gloves.
  ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.

• EYES
  Redness. Pain.
  Safety goggles.
  First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

• INGESTION
  Do not eat, drink, or smoke during work.

SPILLAGE DISPOSAL

Ventilation.

STORAGE

Separated from incompatible materials. See Chemical Dangers. Cool.

PACKAGING & LABELLING

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0047

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TRICHLOROFLUOROMETHANE

1 |

PHYSICAL STATE; APPEARANCE:
COLOURLESS GAS OR HIGHLY VOLATILE

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by
**LIQUID, WITH CHARACTERISTIC ODOUR.**

**PHYSICAL DANGERS:**
The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.

**CHEMICAL DANGERS:**
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases (hydrogen chloride ICSC 0163, phosgene ICSC 0007, hydrogen fluoride ICSC 0283, carboxyl fluoride ICSC 0633).
Reacts with powders of aluminium, zinc, magnesium and lithium shavings; granular barium.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 1000 ppm (Ceiling value); A4; (ACGIH 2004).
MAK: 1000 ppm; 5700 mg/m³;
Peak limitation category: II(2); Pregnancy risk group: C;
(DFG 2004).
OSHA PEL: TWA 1000 ppm (5600 mg/m³)
NIOSH REL: C 1000 ppm (5600 mg/m³)
NIOSH IDLH: 2000 ppm (See: 75694)

**PHYSICAL PROPERTIES**
- Boiling point: 24°C
- Melting point: -111°C
- Relative density (water = 1): 1.49
- Solubility in water, g/100 ml at 20°C: 0.1
- Vapour pressure, kPa at 20°C: 89.0
- Relative vapour density (air = 1): 4.7
- Relative density of the vapour/air-mixture at 20°C (air = 1): 4.4
- Octanol/water partition coefficient as log Pow: 2.53

**ENVIRONMENTAL DATA**
This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.

**NOTES**
High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The occupational exposure limit value should not be exceeded during any part of the working exposure. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Freon 11, Frigen 11, Halon 11 are trade names. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

**ADDITIONAL INFORMATION**

**ICSC: 0047**

TRICHLOROFUOROMETHANE

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**
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Vinyl Chloride

Chloroethene
Chloroethylene
VCM
\(C_2H_3Cl / H_2C=CHCl\)
Molecular mass: 62.5
(cylinder)

ICSC #    0082
CAS #     75-01-4
RTECS #   KU9625000
UN #      1086 (stabilized)
EC #      602-023-00-7
April 13, 2000 Validated

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<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Gas/air mixtures are explosive.</td>
<td>Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.</td>
<td>In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td>• SKIN</td>
<td>ON CONTACT WITH LIQUID: FROSTBITE.</td>
<td>Protective gloves. Cold-insulating gloves. Protective clothing.</td>
<td>ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPILLAGE DISPOSAL
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources.
Personal protection: complete protective clothing including self-contained breathing apparatus.

STORAGE
Fireproof. Separated from incompatible materials. (See Chemical Dangers.) Cool. Store only if stabilized.

PACKAGING & LABELLING
Note: D
F+ symbol
T symbol
R: 45-12
S: 53-45
UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK
Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

ICSC: 0082
### PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:
The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.

### CHEMICAL DANGERS:
The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride, phosgene). Attacks iron and steel in the presence of moisture.

### OCCUPATIONAL EXPOSURE LIMITS:
- **TLV:** 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004).
- **MAK:** Carcinogen category: 1; (DFG 2004).
- **OSHA PEL:** 1910.1017 TWA 1 ppm C 5 ppm 15-minute
- **NIOSH REL:** Ca See Appendix A
- **NIOSH IDLH:** Ca N.D. See: IDLH INDEX

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

### INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes. The liquid may cause frostbite. The substance may cause effects on the central nervous system. Exposure could cause lowering of consciousness. Medical observation is indicated.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, spleen, blood and peripheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.

### PHYSICAL PROPERTIES
- **Boiling point:** -13°C
- **Melting point:** -154°C
- **Relative density (water = 1):** 0.9 (liquid)
- **Density:** 8 (vapour) at 15°C g/l
- **Solubility in water:** none
- **Relative vapour density (air = 1):** 2.2
- **Flash point:** -78°C c.c.
- **Auto-ignition temperature:** 472°C
- **Explosive limits, vol% in air:** 3.6-33
- **Octanol/water partition coefficient as log Pow:** 0.6

### ENVIRONMENTAL DATA
This substance may be hazardous to the environment; special attention should be given to ground water contamination.

### NOTES
Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1086

NFPA Code: H 2; F 4; R 2;

### ADDITIONAL INFORMATION

ICSC: 0082 VINYL CHLORIDE

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# International Chemical Safety Cards

## 1,2,4-TRICHLOROBENZENE

**ICSC:** 1049

1,2,4-Trichlorobenzol  

unsym-Trichlorobenzene  

C₆H₃Cl₃  

Molecular mass: 181.5

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INHALATION</td>
<td>Cough. Sore throat. Burning sensation.</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Sweep spilled substance into sealable containers, if solid. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

### STORAGE

Separated from strong oxidants, acids, food and feedstuffs.

### PACKAGING & LABELLING

- Do not transport with food and feedstuffs.
- Marine pollutant.
- Xn symbol
- N symbol
- R: 22-38-50/53
- S: 2-23-37/39-60-61
- UN Hazard Class: 6.1
- UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

http://www.cdc.gov/niosh/ipcsneng/neng1049.html
1,2,4-TRICHLOROBENZENE

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID OR WHITE CRYSTALS, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic fumes including hydrogen chloride. Reacts violently with oxidants.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 5 ppm; (Ceiling value); (ACGIH 2003).
EU OEL: as TWA 2 ppm, 15.1 mg/m³; as STEL 5 ppm, 37.8 mg/m³; (skin); (EU 2003).
OSHA PEL: none
NIOSH REL: C 5 ppm (40 mg/m³)
NIOSH IDLH: N.D. See: IDLH INDEX

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes, the skin and the respiratory tract.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The liquid defats the skin. The substance may have effects on the liver.

**PHYSICAL PROPERTIES**
- Boiling point: 213°C
- Melting point: 17°C
- Relative density (water = 1): 1.5
- Solubility in water: 34.6 mg/l
- Vapour pressure, Pa at 25°C: 40
- Relative vapour density (air = 1): 6.26
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.002
- Flash point: 105°C c.c.
- Auto-ignition temperature: 571°C
- Explosive limits, vol% in air: 2.5-6.6 (at 150°C)
- Octanol/water partition coefficient as log Pow: 3.98

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

**NOTES**
The occupational exposure limit value should not be exceeded during any part of the working exposure. Also consult ICSC0344 1,3,5-Trichlorobenzene, and ICSC1222 1,2,3-Trichlorobenzene.

Transport Emergency Card: TEC (R)-61GT1-III
NFPA Code: H2; F1; R0;

**ADDITIONAL INFORMATION**

**ICSC: 1049**
(C) IPCS, CEC, 1994

**1,2,4-TRICHLOROBENZENE**

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# International Chemical Safety Cards

## 1,2-DICHLOROBENZENE

**ortho-Dichlorobenzene**  
$\text{C}_6\text{H}_4\text{Cl}_2$  
Molecular mass: 147.0

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>1066</th>
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<tbody>
<tr>
<td>CAS #</td>
<td>95-50-1</td>
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<tr>
<td>RTECS #</td>
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<td>1591</td>
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<td>EC #</td>
<td>602-034-00-7</td>
</tr>
<tr>
<td>November 26, 2003 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

#### FIRE

- Combustible.
- **Prevention**: NO open flames.
- **First Aid/Fire Fighting**: Powder, water spray, foam, carbon dioxide.

#### EXPLOSION

- Above 66°C explosive vapour/air mixtures may be formed.
- **Prevention**: Above 66°C use a closed system, ventilation.

### EXPOSURE

#### •INHALATION

- **Prevention**: Ventilation, local exhaust, or breathing protection.
- **First Aid/Fire Fighting**: Fresh air, rest. Refer for medical attention.

#### •SKIN

- **Prevention**: Protective gloves. Protective clothing.
- **First Aid/Fire Fighting**: Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

#### •EYES

- Redness. Pain.
- **Prevention**: Face shield.
- **First Aid/Fire Fighting**: First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

#### •INGESTION

- **Prevention**: Do not eat, drink, or smoke during work.
- **First Aid/Fire Fighting**: Rinse mouth. Give plenty of water to drink. Do NOT induce vomiting. Refer for medical attention.

### SPILLAGE DISPOSAL

- Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

### STORAGE

- Separated from aluminium, oxidants and food and feedstuffs.

### PACKAGING & LABELLING

- Do not transport with food and feedstuffs. Marine pollutant.  
  - Xn symbol  
  - N symbol  
  - R: 22-36/37/38-50/53  
  - S: 2-23-60-61  
  - UN Hazard Class: 6.1  
  - UN Packing Group: III

---

**SEE IMPORTANT INFORMATION ON BACK**

---

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

1,2-DICHLOROBENZENE

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS TO YELLOW LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic and corrosive gases including hydrogen chloride. Reacts with aluminium and oxidants. Attacks plastic and rubber.

**OCCUPATIONAL EXPOSURE LIMITS:**
OSHA PEL: C 50 ppm (300 mg/m$^3$)
NIOSH REL: C 50 ppm (300 mg/m$^3$)
NIOSH IDLH: 200 ppm See: 95501
TLV: 25 ppm as TWA; 50 ppm as STEL; A4; (ACGIH 2003).

MAK: 10 ppm, 61 mg/m³; H;
Peak limitation category: II(2); Pregnancy risk group: C;
(DFG 2003).

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system and liver. Exposure could cause lowering of consciousness.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The liquid defats the skin. The substance may have effects on the kidneys, blood.

**PHYSICAL PROPERTIES**
Boiling point: 180-183°C
Melting point: -17°C
Relative density (water = 1): 1.3
Solubility in water: very poor
Vapour pressure, kPa at 20°C: 0.16
Relative vapour density (air = 1): 5.1
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.006
Flash point: 66°C c.c.
Auto-ignition temperature: 648°C
Explosive limits, vol% in air: 2.2-9.2
Octanol/water partition coefficient as log Pow: 3.38

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. It is strongly advised that this substance does not enter the environment.

**NOTES**
Transport Emergency Card: TEC (R)-61GT1-III
NFPA Code: H2; F2; R0;

**ADDITIONAL INFORMATION**

**ICSC: 1066**
(C) IPCS, CEC, 1994

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version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

## 1,3-DICHLOROBENZENE  
**ICSC: 1095**

**m-Dichlorobenzene  
m-Phenylene dichloride  
C₆H₄Cl₂  
Molecular mass: 147.00**

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<td>April 10, 2000 Validated</td>
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### Types of Hazard/Exposure

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<thead>
<tr>
<th>FIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACUTE HAZARDS/SYMPTOMS</strong></td>
</tr>
<tr>
<td><strong>PREVENTION</strong></td>
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<table>
<thead>
<tr>
<th>EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PREVENT GENERATION OF MISTS!</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INHALATION</th>
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<tr>
<td><strong>PREVENTION</strong></td>
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<table>
<thead>
<tr>
<th>SKIN</th>
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<table>
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<td><strong>ACUTE HAZARDS/SYMPTOMS</strong></td>
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<td><strong>PREVENTION</strong></td>
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<td><strong>PREVENTION</strong></td>
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<td><strong>FIRST AID/FIRE FIGHTING</strong></td>
</tr>
</tbody>
</table>

### Spillage Disposal

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter

### Storage

Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access. Separated from strong oxidants, aluminium, food and feedstuffs. Well closed.

### Packaging & Labelling

Do not transport with food and feedstuffs.  
Xn symbol  
N symbol  
R: 22-51/53

[http://www.cdc.gov/niosh/ipcsneng/neng1095.html](http://www.cdc.gov/niosh/ipcsneng/neng1095.html)
International Chemical Safety Cards

1,3-DICHLOROBENZENE

ICSC: 1095

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID

PHYSICAL DANGERS:
The vapour is heavier than air.

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic fumes including hydrogen chloride. Reacts with strong oxidants. Reacts violently with aluminium.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK: 2 ppm, 12 mg/m³;
Peak limitation category: II(2); Pregnancy risk group: C;
(DFG 2008).

PHYSICAL PROPERTIES
Boiling point: 173°C
Melting point: -24.8°C
Relative density (water = 1): 1.288
Solubility in water: none

Vapour pressure, kPa at 25°C: 0.286
Relative vapour density (air = 1): 5.1
Flash point: 63°C
Octanol/water partition coefficient as log Pow: 3.53

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

NOTES
Data on the toxicity of m-dichlorobenzene are limited. Also consult ICSC #0037 (p-Dichlorobenzene) and #1066 (o-Dichlorobenzene).

Card has been partially updated in November 2008: see Occupational Exposure Limits, Storage.

ADDITIONAL INFORMATION
IMPORTANT LEGAL NOTICE:
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International Chemical Safety Cards

**1,4-DICHLOROBENZENE**

ICSC: 0037

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 66°C explosive vapour/air mixtures may be formed.</td>
<td>Above 66°C use a closed system, ventilation, and explosion-proof electrical equipment.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKIN</td>
<td>Protective gloves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>Diarrhoea. (Further see Inhalation)</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Give plenty of water to drink. Refer for medical attention.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let

**STORAGE**
Provision to contain effluent from fire extinguishing. Separated from strong oxidants, food and feedstuffs. Keep in a well-ventilated room.

**PACKAGING & LABELLING**
Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 36-40-50/53
**1,4-DICHLOROBENZENE**

**ICSC: 0037**

<table>
<thead>
<tr>
<th>Physical State: Appearance</th>
<th>Routes of Exposure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colourless to white crystals, with characteristic odour.</td>
<td>The substance can be absorbed into the body by inhalation and by ingestion.</td>
</tr>
</tbody>
</table>

**Physical Dangers:**

On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with strong oxidants.

**Chemical Dangers:**

**Occupational Exposure Limits:**

- TLV: 10 ppm as TWA; A3; (ACGIH 2004).
- MAK: H;
- Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
- OSHA PEL†: TWA 75 ppm (450 mg/m³)
- NIOSH REL: Ca See Appendix A
- NIOSH IDLH: Ca 150 ppm See: 106467

**Inhalation Risk:**

A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

**Effects of Short-Term Exposure:**

The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the blood, resulting in haemolytic anaemia. The substance may cause effects on the central nervous system. Medical observation is indicated.

**Effects of Long-Term or Repeated Exposure:**

The substance may have effects on the liver, kidneys and blood. This substance is possibly carcinogenic to humans.

**Physical Properties:**

- Boiling point: 174°C
- Melting point: 53°C
- Density: 1.2 g/cm³
- Solubility in water: at 25 °C 80 mg/l
- Vapour pressure, Pa at 20°C: 170
- Relative vapour density (air = 1): 5.08
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
- Flash point: 66°C c.c.
- Explosive limits, vol% in air: 6.2-16
- Octanol/water partition coefficient as log Pow: 3.37

**Environmental Data:**

The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

**Notes:**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-90GM7-III

http://www.cdc.gov/niosh/ipcsneng/neng0037.html
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### International Chemical Safety Cards

#### 2,4,5-TRICHLOROPHENOL

**ICSC: 0879**

**2,4,5-TCP**  
1-Hydroxy-2,4,5-trichlorobenzene  
\( C_6H_3Cl_3O \) / \( C_6H_2Cl_3(OH) \)  
Molecular mass: 197.5

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0879</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>95-95-4</td>
</tr>
<tr>
<td>RTECS #</td>
<td>SN1400000</td>
</tr>
<tr>
<td>UN #</td>
<td>2020</td>
</tr>
<tr>
<td>EC #</td>
<td>604-017-00-X</td>
</tr>
<tr>
<td>March 25, 1998 Validated</td>
<td></td>
</tr>
</tbody>
</table>

#### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with strong oxidants.</td>
<td>Water spray, powder.</td>
</tr>
</tbody>
</table>

#### EXPLOSION

<table>
<thead>
<tr>
<th>EXPLOSION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### EXPOSURE

| • INHALATION | | PREVENT DISPERSION OF DUST! |
|--------------||-----------------------------|
| Cough.       | | |
|              | | |

| • SKIN | | Protective gloves. Protective clothing. |
|--------||-----------------------------|
| Redness. Pain. | | First rinse with plenty of water, then remove contaminated clothes and rinse again. Refer for medical attention. |

| • EYES | | Safety goggles, face shield, or eye protection in combination with breathing protection if powder. |
|--------||-----------------------------|
| Redness. Pain. Blurred vision. | | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

| • INGESTION | | Do not eat, drink, or smoke during work. Wash hands before eating. |
|-------------||-----------------------------|

#### SPILLAGE DISPOSAL

(Extra personal protection: A/P2 filter respirator for organic vapour and harmful dust). Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then

#### STORAGE

Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

#### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Marine pollutant.  
Xn symbol  
N symbol  
R: 22-36/38-50/53
2,4,5-TRICHLOROPHENOL

ICSC: 0879

### Physical State: Appearance:
- Colourless crystals or grey flakes, with characteristic odour.

### Physical Dangers:
May explode on heating to decomposition. The substance decomposes on heating and on contact with strong oxidants producing toxic and irritating fumes (chlorine, hydrochloric acid). The substance is a weak acid. Reacts in an alkaline medium at high temperatures producing highly toxic chlorinated dioxins.

### Chemical Dangers:
- May explode on heating to decomposition.
- The substance decomposes on heating and on contact with strong oxidants producing toxic and irritating fumes (chlorine, hydrochloric acid).
- The substance is a weak acid. Reacts in an alkaline medium at high temperatures producing highly toxic chlorinated dioxins.

### Occupational Exposure Limits:
- TLV not established.
- MAK: IIb (not established but data is available) (DFG 2008).

### Routes of Exposure:
The substance can be absorbed into the body by inhalation and through the skin and by ingestion.

### Inhalation Risk:
No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.

### Effects of Short-Term Exposure:
The substance irritates the eyes, the skin and the respiratory tract.

### Effects of Long-Term or Repeated Exposure:
- Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. (see Notes).
- at PR-update 2010, consulting K. Straif (IARC): for this particular compound there is inadequate evidence from animal data on carcinogenicity. There is human data for the mixture of polychlorophenols indicating that the mixture may have carcinogenic potential (equal to IARC group 3).

### Physical Properties
- Boiling point: 253°C
- Melting point: 67°C
- Density: 1.68 g/cm³

### Solubility in water,
- g/100 ml at 25°C: 0.1
- Vapour pressure, Pa at 25°C: 2.9
- Octanol/water partition coefficient as log Pow: 3.7

### Environmental Data
- The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.

### Notes
Technical products may contain highly toxic impurities such as polychlorinated dibenzodioxins and dibenzofurans. The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Caswell No. 879, Collunol, Dowicide 2, NCI-C61187, Nurelle, Preventol I are trade names. Also consult ICSC #0588 2,3,4-trichlorophenol, ICSC #0589 2,3,5-trichlorophenol, ICSC #0590 2,3,6-trichlorophenol and ICSC #1122 2,4,6-trichlorophenol.
Transport Emergency Card: TEC (R)-804
Card has been partially updated in November 2008: see Occupational Exposure Limits,
Card has been partially updated in May 2010: see Effects of Long-Term or Repeated Exposure.

<table>
<thead>
<tr>
<th>ICSC: 0879</th>
<th>2,4,5-TRICHLOROPHENOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
</tr>
</tbody>
</table>

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# International Chemical Safety Cards

## 2,4,6-TRICHLOROPHENOL

**ICSC: 1122**

<table>
<thead>
<tr>
<th>2,4,6-TCP</th>
<th>(C_6H_3Cl_3O) / (C_6H_2Cl_3OH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular mass: 197.45</td>
<td></td>
</tr>
</tbody>
</table>

**ICSC #: 1122**  
**CAS #: 88-06-2**  
**RTECS #: SN1575000**  
**UN #: 2020**  
**EC #: 604-018-00-5**  
November 25, 1998 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: all extinguishing agents allowed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPLOSION EXPOSURE

<table>
<thead>
<tr>
<th>EXPLOSION</th>
<th>AVOID ALL CONTACT!</th>
</tr>
</thead>
<tbody>
<tr>
<td>In all cases consult a doctor!</td>
<td></td>
</tr>
</tbody>
</table>

### INHALATION

- Cough. Sore throat.  
- Ventilation (not if powder), local exhaust, or breathing protection.  
- Fresh air, rest. Refer for medical attention.

### SKIN

- Redness.  
- Protective gloves. Protective clothing.  
- Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

### EYES

- Redness. Pain.  
- Safety goggles, or face shield.  
- First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

### INGESTION

- Do not eat, drink, or smoke during work.  
- Rinse mouth. Refer immediately for medical attention.

### SPILLAGE DISPOSAL

- Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for)

### STORAGE

- Separated from strong oxidants, and food and feedstuffs. Well closed.

### PACKAGING & LABELLING

- Do not transport with food and feedstuffs.  
- Xn symbol  
- N symbol  
- R: 22-36/38-40-50/53  
- S: 2-36/37-60-61  
- UN Hazard Class: 6.1

---

http://www.cdc.gov/niosh/ipcsneng/neng1122.html  
12/9/2011
### 2,4,6-TRICHLOROPHENOL

**ICSC: 1122**

#### PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW CRYSTALS, WITH CHARACTERISTIC ODOUR.

#### PHYSICAL DANGERS:

#### CHEMICAL DANGERS:
The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride and chlorine fumes. Reacts with strong oxidants.

#### OCCUPATIONAL EXPOSURE LIMITS:
TLV not established. MAK not established.

#### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

#### INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

#### EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract.

#### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis including chloracne. The substance may have effects on the liver, resulting in impaired functions. (EPA has determined that this substance is a probable carcinogen).

#### PHYSICAL PROPERTIES
- Boiling point: 246°C
- Melting point: 69°C
- Density: 1.5 g/cm³ at 58°C
- Solubility in water: none

#### Vapour pressure, Pa at 76.5°C: 133
- Flash point: 99°C c.c.
- Octanol/water partition coefficient as log Pow: 3.87

#### ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

#### NOTES
Technical grade of this substance may include the polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans and other contaminants. Dowicide 2S, Omal are trade names.

Transport Emergency Card: TEC (R)-804/61G12c Card has been partially updated in May 2010: see Effects of Long-Term or Repeated Exposure.

**ADDITIONAL INFORMATION**

(C) IPCS, CEC, 1994
<table>
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<tr>
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</tr>
</tbody>
</table>
# 2,4-DICHLOROPHENOL

**ICSC: 0438**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>water spray, foam, powder, carbon dioxide</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>Sore throat. Cough. Burning sensation behind the breastbone. Shortness of breath. Laboured breathing. Further see Inhalation.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Half-upright position. Refer immediately for medical attention.</td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>MAY BE ABSORBED! Redness. Pain. Blisters. (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Wear protective gloves when administering first aid. Remove contaminated clothes. (See Notes). To remove substance use polyethylene glycol 400 or vegetable oil. Rinse skin with plenty of water or shower. Refer immediately for medical attention.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Redness. Pain. Severe burns. Severe corneal damage</td>
<td>Face shield and eye protection in combination with breathing protection.</td>
<td>Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Burns in mouth and throat.</td>
<td>Do not eat, drink, or smoke</td>
<td>Rinse mouth. Do NOT induce</td>
</tr>
</tbody>
</table>
**INGESTION**
Abdominal pain, Tremor, Convulsions. Shock or collapse during work. Vomiting. Refer immediately for medical attention.

<table>
<thead>
<tr>
<th><strong>SPILLAGE DISPOSAL</strong></th>
<th><strong>STORAGE</strong></th>
<th><strong>PACKAGING &amp; LABELLING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal protection: Chemical protection suit including self-contained breathing apparatus. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.</td>
<td>Fireproof. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. Separated from strong oxidants, food and feedstuffs. Ventilation along the floor. 22309000</td>
<td>Do not transport with food and feedstuffs. T symbol N symbol R: 22-24-34-51/53 S: 1/2-26-37/39-45-61 UN Hazard Class: 6.1 UN Packing Group: III Signal: Danger Corr-Skull-Health haz-Enviro Harmful if swallowed Toxic in contact with skin Causes severe skin burns and eye damage Causes damage to the central nervous system May cause damage to the respiratory system if inhaled Toxic to aquatic life with long-lasting effects</td>
</tr>
</tbody>
</table>

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0438

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

**International Chemical Safety Cards**

**2,4-DICHLOROPHENOL**

**ICSC: 0438**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE:</strong> COLOURLESS CRYSTALS, WITH CHARACTERISTIC ODOUR.</td>
<td><strong>PHYSICAL DANGERS:</strong> Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc. Wiley's Guide to Incombitable chemicals, 3rd ed.</td>
</tr>
<tr>
<td><strong>CHEMICAL DANGERS:</strong> The substance decomposes on heating producing toxic fumes including chlorine, hydrogen chloride, and on burning phosgene and dioxins. Reacts violently with acids and strong oxidants. ESTIS</td>
<td><strong>OCUPATIONAL EXPOSURE LIMITS:</strong> TLV not established. MAK not established.</td>
</tr>
</tbody>
</table>

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion. Serious local effects by all routes of exposure. 

**INHALATION RISK:**
A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C; when in molten form, however, evaporation will be much faster.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. The hot liquid may cause severe skin burns. Exposure to the molten substance may result in extensive skin absorption and rapid death. Inhalation of the vapour may cause lung oedema (see Notes). Medical observation is indicated. The substance may cause effects on

<table>
<thead>
<tr>
<th>P</th>
<th>O</th>
<th>R</th>
</tr>
</thead>
<tbody>
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<td><strong>CHEMICAL DANGERS:</strong> The substance decomposes on heating producing toxic fumes including chlorine, hydrogen chloride, and on burning phosgene and dioxins. Reacts violently with acids and strong oxidants. ESTIS</td>
<td><strong>OCUPATIONAL EXPOSURE LIMITS:</strong> TLV not established. MAK not established.</td>
<td><strong>INHALATION RISK:</strong> A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C; when in molten form, however, evaporation will be much faster.</td>
</tr>
</tbody>
</table>

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. The hot liquid may cause severe skin burns. Exposure to the molten substance may result in extensive skin absorption and rapid death. Inhalation of the vapour may cause lung oedema (see Notes). Medical observation is indicated. The substance may cause effects on

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

The central nervous system is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>210.0°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>45.0°C</td>
</tr>
<tr>
<td>Density</td>
<td>1.4 g/cm³</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>0.45 g/100 ml at 20°C</td>
</tr>
<tr>
<td>Vapour pressure, Pa</td>
<td>10 Pa at 20°C</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>5.6 (air = 1)</td>
</tr>
<tr>
<td>Relative density of vapour</td>
<td>1.00 at 20°C</td>
</tr>
<tr>
<td>Flashpoint</td>
<td>113°C c.c.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>500°C</td>
</tr>
<tr>
<td>Octanol/water partition coefficient</td>
<td>log Pow: 3.17</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

### NOTES

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Isolate contaminated clothing by sealing in a bag or other container.

NFPA Code: H3; F1; R0.

### ADDITIONAL INFORMATION

ICSC: 0438 2,4-DICHLOROPHENOL

(C) IPCS, CEC, 1994

### IMPORTANT LEGAL NOTICE:

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# International Chemical Safety Cards

## 2,4-XYLENOL

**ICSC: 0458**

<table>
<thead>
<tr>
<th>Types of Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fire</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, alcohol-resistant foam, water spray, carbon dioxide.</td>
</tr>
<tr>
<td><strong>Explosion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exposure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td>Redness. Pain. Severe deep burns.</td>
<td>Safety goggles, face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

**Spillage Disposal**

**Storage**

**Packaging & Labelling**
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. If liquid: Collect leaking liquid in covered plastic containers. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.

Separated from food and feedstuffs, acid anhydrides, acid chlorides, bases and oxidants.

Do not transport with food and feedstuffs.
Marine pollutant.
Note: C
T symbol
N symbol
R: 24/25-34
S: 1/2-36/39
UN Hazard Class: 6.1
UN Packing Group: II

Separated from food and feedstuffs, acid anhydrides, acid chlorides, bases and oxidants.

Do not transport with food and feedstuffs.
Marine pollutant.
Note: C
T symbol
N symbol
R: 24/25-51/53
S: 1/2-26-37-39-45-61
UN Hazard Class: 6.1
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0458

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

2,4-XYLENOL

ICSC: 0458

PHYSICAL STATE; APPEARANCE:
YELLOW TO BROWN LIQUID OR COLOURLESS CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic gases and irritating fumes.
Reacts with acid anhydrides, acid chlorides, bases, oxidants.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, by ingestion and through the skin.

INHALATION RISK:
No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is corrosive to the skin the respiratory tract and the eyes. Corrosive on ingestion. Inhalation of an aerosol of this substance may cause lung oedema (see Notes).

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES
Boiling point: 211.5°C
Melting point: 25.4-26°C
Density: 0.97
g/cm³
Solubility in water, g/100 ml at 25°C: 0.79

Vapour pressure, Pa at 20°C: 8
Flash point: >112°C c.c.
Auto-ignition temperature: 599°C
Explosive limits, vol% in air: 1.1-6.4
Octanol/water partition coefficient as log Pow: 2.3

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

NOTES

http://www.cdc.gov/niosh/ipcsneng/neng0458.html

12/9/2011
The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. Card has been partly updated in October 2005. See section EU classification.

NFPA Code: H2; F1; R; 0
Transport Emergency Card: TEC (R)-61GT1-II

ADDITIONAL INFORMATION

ICSC: 0458

2,4-XYLENOL

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# 2,4-DINITROPHENOL

**ICSC:** 0464

1-Hydroxy-2,4-dinitrobenzene  
\( C_6H_4N_2O_5 / C_6H_3(OH)(NO_2)_2 \)  
Molecular mass: 184.11

<table>
<thead>
<tr>
<th>TYPES OF EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Water in large amounts.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Risk of fire and explosion.</td>
<td>Do NOT expose to friction or shock.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.</td>
</tr>
</tbody>
</table>

**EXPOSURE**  
PREVENT DISPERSION OF DUST! STRICT HYGIENE!

- **INHALATION**  
  See Ingestion.  
  Local exhaust or breathing protection.  
  Fresh air, rest (see Notes). Refer for medical attention.

- **SKIN**  
  MAY BE ABSORBED!  
  Redness. Roughness. Yellow staining of the skin. (Further see Inhalation).  
  Protective gloves. Protective clothing.  
  Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

- **EYES**  
  Safety goggles.  
  First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**  
  Do not eat, drink, or smoke during work.  
  Rest. Refer for medical attention.

**SPILLAGE DISPOSAL**  
Evacuate danger area! Do not allow to dry out. Sweep spilled substance into containers. Wipe up remainder in sand or other inert material, then remove to safe place. Personal protection: complete protective clothing including

**STORAGE**  
Fireproof. Separated from combustible and reducing substances, food and feedstuffs. Cool.

**PACKAGING & LABELLING**  
Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.  
Marine pollutant.  
Note: C

---

[Source](http://www.cdc.gov/niosh/ipcsneng/neng0464.html)  
12/9/2011
self-contained breathing apparatus.

<table>
<thead>
<tr>
<th>T symbol</th>
<th>N symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Hazard Class: 4.1</td>
<td>UN Subsidiary Risks: 6.1</td>
</tr>
<tr>
<td>UN Packing Group: I</td>
<td></td>
</tr>
</tbody>
</table>

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0464

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

2,4-DINITROPHENOL

ICSC: 0464

PHYSICAL STATE: APPEARANCE:
YELLOW CRYSTALS. (SEE NOTES).

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
May explosively decompose on shock, friction, or concussion. May explode on heating. Shock-sensitive compounds are formed with alkalis, ammonia and most metals. The substance decomposes on heating producing toxic gases including nitrogen oxides (see Notes).

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

PHYSICAL PROPERTIES

Sublimation
Melting point: 112°C
Relative density (water = 1): 1.68

Solubility in water, g/100 ml at 54.5°C: 0.14
Relative vapour density (air = 1): 6.36

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to aquatic organisms.

NOTES

Use all available methods for reducing body temperature. Because of its explosive properties, the compound is used in the form of a water paste. UN 0076 applies to the dry compound. CAS 25550-58-7 applies to unspecified isomers of dinitrophenol. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-41GDT-I

http://www.cdc.gov/niosh/ipcsneng/neng0464.html

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## International Chemical Safety Cards

### 2,4-DINITROTOLUENE

1-Methyl-2,4-dinitrobenzene  
2,4-DNT  
C₇H₆N₂O₄ / C₆H₃CH₃(NO₂)₂  
Molecular mass: 182.1

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0727</th>
<th>CAS #</th>
<th>121-14-2</th>
<th>RTECS #</th>
<th>XT1575000</th>
<th>UN #</th>
<th>3454</th>
<th>EC #</th>
<th>609-007-00-9</th>
<th>April 21, 2005 Validated</th>
</tr>
</thead>
</table>

#### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air. Risk of explosion on contact with many substances.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.</td>
</tr>
</tbody>
</table>

#### EXPOSURE

<table>
<thead>
<tr>
<th>INHALATION</th>
<th>WARNING: PREVENT DISPERSION OF DUST! STRICT HYGIENE!</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKIN</td>
<td>MAY BE ABSORBED! (See Inhalation).</td>
</tr>
<tr>
<td>EYES</td>
<td>Safety goggles.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>(See Inhalation).</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus.

### STORAGE

Fireproof. Separated from strong bases, food and feedstuffs.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.
| contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. | feedstuffs oxidants, strong reducing agents. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access. | Note: E T symbol N symbol R: 45-23/24/25-48/22-62-68-51/53 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: II |

**ICSC: 0727**

**International Chemical Safety Cards**

**2,4-DINITROTOLUENE**

| I | PHYSICAL STATE; APPEARANCE: YELLOW CRYSTALS, WITH CHARACTERISTIC ODOUR. |
| M | PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air. |
| P | CHEMICAL DANGERS: May explode on heating. The substance decomposes on heating producing toxic and corrosive fumes including nitrogen oxides even in absence of air. Reacts with reducing agents, strong bases and oxidants causing explosion hazard. |
| O | OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.2 mg/m³ as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2005). |
| R | MAK: skin absorption (H); Carcinogen category: 2; (DFG 2004). TLV and MAK are for mixed isomers (CAS 25321-14-6). |
| T | ROUTES OF EXPOSURE: The substance can be absorbed into the body by ingestion, through the skin and by inhalation. |
| A | INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered. |
| N | EFFECTS OF SHORT-TERM EXPOSURE: The substance may cause effects on the blood, resulting in formation of methaemoglobin. The effects may be delayed. Medical observation is indicated. |
| T | EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the blood, resulting in formation of methaemoglobin. This substance is possibly carcinogenic to humans. |

| PHYSICAL PROPERTIES | Boiling point (decomposes): >250°C | Vapour pressure, Pa at 25°C: 0.02 |
| D | Melting point: 71°C | Relative vapour density (air = 1): 6.28 |
| A | Density: 1.52 | Flash point: 169°C c.c. |
| T | g/cm³ | Octanol/water partition coefficient as log Pow: 1.98 |
| A | Solubility in water: very poor |

**ENVIRONMENTAL DATA**

The substance is harmful to aquatic organisms.

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Specific treatment is necessary in case

**http://www.cdc.gov/niosh/ipcsneng/neng0727.html**
of poisoning with this substance; the appropriate means with instructions must be available. Do NOT take working clothes home. UN number for molten form: UN1600, TEC (R): 61GT1-II

Transport Emergency Card: TEC (R)-61S3454; 61GT2-II

NFPA Code: H3; F1; R3;

<table>
<thead>
<tr>
<th>ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICSC: 0727 2,4-DINITROTOLUENE</td>
</tr>
</tbody>
</table>

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# International Chemical Safety Cards

## 2,6-DINITROTOLUENE

ICSC: 0728

1-Methyl-2,6-dinitrobenzene  
2,6-DNT  
C₇H₆N₂O₄ / C₆H₃CH₃(NO₂)₂  
Molecular mass: 182.1

<table>
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<tr>
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<tbody>
<tr>
<td>CAS #</td>
<td>606-20-2</td>
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<tr>
<td>RTECS #</td>
<td>XT1925000</td>
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<td>3454</td>
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<tr>
<td>EC #</td>
<td>609-049-00-8</td>
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</tbody>
</table>

April 21, 2005 Validated

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
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</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air. Risk of explosion on contact with many substances.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.</td>
</tr>
</tbody>
</table>

### EXPOSURE

**•INHALATION**


Local exhaust or breathing protection.

Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

**•SKIN**

MAY BE ABSORBED! (See Inhalation).

Protective gloves. Protective clothing.

Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

**•EYES**

Face shield.

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**•INGESTION**

(See Inhalation).

Do not eat, drink, or smoke during work. Wash hands before eating.

Rinse mouth. Give plenty of water to drink. Refer for medical attention.

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp;</th>
</tr>
</thead>
</table>

http://www.cdc.gov/niosh/ipcsneng/neng0728.html

12/9/2011
Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.


Do not transport with food and feedstuffs.

Note: E T symbol
R: 45-23/24/25-48/22-62-68-52/53
S: 53-45-61
UN Hazard Class: 6.1
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0728

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International Chemical Safety Cards

2,6-DINITROTOLUENE

ICSC: 0728

PHYSICAL STATE; APPEARANCE:
YELLOW, BROWN TO RED CRYSTALS, WITH CHARACTERISTIC ODOR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
May explode on heating. The substance decomposes on heating producing toxic and corrosive fumes, including nitrogen oxides even in absence of air. Reacts with reducing agents, strong bases and oxidants causing explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.2 mg/m³ as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).

MAK: skin absorption (H);
Carcinogen category: 2;
(DFG 2004).

TLV and MAK are for mixed isomers (CAS 25321-14-6)

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the blood, resulting in formation of methaemoglobin. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood, resulting in formation of methaemoglobin. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES
Boiling point (decomposes): 285°C
Melting point: 66°C
Relative density (water = 1): 1.283 (liquid)
Solubility in water: very poor

Vapour pressure, Pa at 20°C: 2.4
Relative vapour density (air = 1): 6.28
Flash point: 207°C c.c.
Octanol/water partition coefficient as log Pow: 2.05

ENVIRONMENTAL DATA

NOTES
Depending on the degree of exposure, periodic medical examination is suggested. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Do NOT take working clothes home. UN number for molten form: UN1600. See also ICSC0465 Dinitrotoluene (mixed isomers).

Transport Emergency Card: TEC (R)-61S3454; 61GT2-II

NFPA Code: H3; F1; R3;

<table>
<thead>
<tr>
<th>ICSC: 0728</th>
<th>2,6-DINITROTOLUENE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
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---

http://www.cdc.gov/niosh/ipcsneng/neng0728.html

12/9/2011
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: 4-Bromodiphenyl ether

Product Number: B65209
Brand: Aldrich

Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C12H9BrO
Molecular Weight: 249.1 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>101-55-3</td>
<td>202-952-4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion., Skin sensitizer, Irritant

HMIS Classification

Health Hazard: 2
Flammability: 1
Physical hazards: 0

NFPA Rating

Health Hazard: 2
Fire: 1
Reactivity Hazard: 0

Potential Health Effects

Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.
Ingestion: Harmful if swallowed.

4. FIRST AID MEASURES
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point > 113.0 °C (> 235.4 °F) - closed cup
Ignition temperature no data available

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods for cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Hand protection
Handle with gloves.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour colourless

Safety data
pH no data available
Melting point 18 °C (64 °F)
Boiling point 305 °C (581 °F)
Flash point > 113.0 °C (> 235.4 °F) - closed cup
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Density 1.423 g/mL at 25 °C (77 °F)
Water solubility no data available
Partition coefficient n-octanol/water log Pow: 4.34

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen bromide gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
no data available

Irritation and corrosion
no data available
Sensitisation
May cause sensitization by skin contact.

Chronic exposure
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

<table>
<thead>
<tr>
<th>Route</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>May be harmful if inhaled. Causes respiratory tract irritation.</td>
</tr>
<tr>
<td>Skin</td>
<td>May be harmful if absorbed through skin. Causes skin irritation.</td>
</tr>
<tr>
<td>Eyes</td>
<td>Causes eye irritation.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Harmful if swallowed.</td>
</tr>
</tbody>
</table>

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)
no data available

Ecotoxicity effects

<table>
<thead>
<tr>
<th>Toxicity to fish</th>
<th>LC50 - Lepomis macrochirus (Bluegill) - 50.90 mg/l - 24 h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LC50 - Lepomis macrochirus (Bluegill) - 9.00 mg/l - 40 h</td>
</tr>
</tbody>
</table>

Further information on ecology
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s.
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 3082  Class: 9  Packing group: III  EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (4-Bromophenyl phenyl ether)
Marine pollutant: No

IATA
UN-Number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid n.o.s. (4-Bromophenyl phenyl ether)

15. REGULATORY INFORMATION

OSHA Hazards
Harmful by ingestion., Skin sensitizer, Irritant

DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Bromophenyl phenyl ether</td>
<td>101-55-3</td>
</tr>
</tbody>
</table>

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Bromophenyl phenyl ether</td>
<td>101-55-3</td>
<td>1989-12-01</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Bromophenyl phenyl ether</td>
<td>101-55-3</td>
<td>1989-12-01</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Bromophenyl phenyl ether</td>
<td>101-55-3</td>
<td>1989-12-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## 0-CHLOROPHENOL

ICSC: 0849

- **2-Chlorophenol**
- **2-Chloro-1-hydroxybenzene**
- **2-Hydroxychlorobenzene**

\[ C_6H_5ClO \quad C_6H_4ClOH \]

**Molecular mass:** 128.6

**ICSC #** 0849  
**CAS #** 95-57-8  
**RTECS #** SK2625000  
**UN #** 2021  
**EC #** 604-008-00-0  
March 24, 1999 Validated

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Above 64°C explosive vapour/air mixtures may be formed.</td>
<td>Above 64°C use a closed system, ventilation.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

## EXPOSURE

<table>
<thead>
<tr>
<th><strong>EXPOSURE</strong></th>
<th><strong>PREVENT GENERATION OF MISTS!</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough. Shortness of breath. Sore throat. (see Ingestion). Symptoms may be delayed (see Notes).</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>MAY BE ABSORBED! Redness. Pain.</td>
</tr>
</tbody>
</table>

**PREVENTION**

- Ventilation, local exhaust, or breathing protection.
- Protective gloves. Protective clothing.
- Face shield, or eye protection in combination with breathing protection.
- Do not eat, drink, or smoke during work.

**FIRST AID/FIRE FIGHTING**

- Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
- Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
- First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
- Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

## SPILLAGE DISPOSAL

Collect leaking liquid in covered containers. Carefully collect remainder.

## STORAGE

Separated from strong oxidants, food and feedstuffs. Well closed.

## PACKAGING & LABELLING

Do not transport with food and feedstuffs.
then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours). Chemical protection suit.

Marine pollutant.
Note: C
Xn symbol
N symbol
R: 20/21/22-51/53
S: 2-28-61
UN Hazard Class: 6.1
UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0849

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

0-CHLOROPHENOL

| I | M | P | O | R | T | A | N | T | D | A | T | A
|---|---|---|---|---|---|---|---|---|---|---|---|--- |

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**
The vapour is heavier than air.

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic and corrosive fumes (hydrochloric acid, chlorine). Reacts with oxidants.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.

**PHYSICAL PROPERTIES**
- Boiling point: 175°C
- Melting point: 9.3-9.8
- Relative density (water = 1): 1.3
- Solubility in water, g/100 ml at 20°C: 2.85
- Vapour pressure, Pa at 20°C: 230
- Relative vapour density (air = 1): 4.4
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.08
- Flash point: 64°C C.C.
- Octanol/water partition coefficient as log Pow: 2.15

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

**NOTES**
The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by

http://www.cdc.gov/niosh/ipcsneng/neng0849.html

12/9/2011
a doctor or a person authorized by him/her, should be considered. Pine-O Disinfectant and Septi-Kleen are trade names.

Transport Emergency Card: TEC (R)-799

NFPA Code: H3; F2; R0;

### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>ICSC: 0849</th>
<th>o-CHLOROPHENOL</th>
</tr>
</thead>
</table>

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## 2-METHYLNAPHTHALENE

ICSC: 1276

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>ROUTINES OF EXPOSURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRYSTALS</td>
<td>The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</td>
</tr>
</tbody>
</table>

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Types of Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible</td>
<td>NO open flames.</td>
<td>Powder, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough.</td>
<td>Local exhaust.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td></td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
<td>Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### Spillage Disposal

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

### Storage

Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

### Packaging & Labelling

Marine pollutant.

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
### CHEMICAL DANGERS:
The substance decomposes on heating producing acrid smoke and irritating fumes.

### OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.5 ppm as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2008).
MAK not established.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Lungs may be affected by repeated or prolonged exposure.

### PHYSICAL PROPERTIES
- Boiling point: 241°C
- Melting point: 35°C
- Relative density (water = 1): 1.00
- Solubility in water, g/100 ml at 25°C: 0.003
- Vapour pressure, Pa at °C: 9
- Octanol/water partition coefficient as log Pow: 3.86

### ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

### NOTES
Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.
Card has been partially updated in February 2009: see Occupational Exposure Limits,

### ADDITIONAL INFORMATION

### ICSC: 1276
2-METHYLNAPHTHALENE
(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## o-CRESOL

ICSC: 0030

![Chemical Logo]

2-Hydroxy-1-methylbenzene  
2-Methylphenol  
ortho-Hydroxytoluene  
2-Cresol  

\[ \text{C}_7\text{H}_8\text{O} / \text{CH}_3\text{C}_6\text{H}_4\text{OH} \]

Molecular mass: 108.1

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0030</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>95-48-7</td>
</tr>
<tr>
<td>RTECS #</td>
<td>GO6300000</td>
</tr>
<tr>
<td>UN #</td>
<td>3455</td>
</tr>
<tr>
<td>EC #</td>
<td>604-004-00-9</td>
</tr>
</tbody>
</table>

November 13, 2008 Validated

## TYPES OF HAZARD/EXPOSURE

### FIRE

FIRE Combustible. Gives off irritating or toxic fumes (or gases) in a fire.  

**PREVENTION**  

NO open flames.  

**FIRST AID/FIRE FIGHTING**  

Water spray, foam, powder, carbon dioxide.

### EXPLOSION

EXPLOSION Above 81°C explosive vapour/air mixtures may be formed.  

**PREVENTION**  

Above 81°C use a closed system, ventilation.

### EXPOSURE

EXPOSURE AVOID ALL CONTACT!  

IN ALL CASES CONSULT A DOCTOR!

### INHALATION


**PREVENTION**  

Local exhaust or breathing protection.  

**FIRST AID/FIRE FIGHTING**  

Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer immediately for medical attention.

### SKIN


**PREVENTION**  

Protective gloves. Protective clothing.  

**FIRST AID/FIRE FIGHTING**  

Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer immediately for medical attention.

### EYES


**PREVENTION**  

Face shield or eye protection in combination with breathing protection.  

**FIRST AID/FIRE FIGHTING**  

Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

### INGESTION


**PREVENTION**  

Do not eat, drink, or smoke during work. Wash hands before eating.  

**FIRST AID/FIRE FIGHTING**  

Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

## SPILLAGE DISPOSAL

## STORAGE

## PACKAGING & LABELLING

http://www.cdc.gov/niosh/ipcsneng/neng0030.html

12/9/2011
Personal protection: filter respirator for organic gases and particulates adapted to the airborne concentration of the substance. Chemical protection suit. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

Do not transport with food and feedstuffs. Marine pollutant.

Note: C
T symbol
C symbol
R: 24/25-34
S: 1/2-36/37/39-45
UN Hazard Class: 6.1
UN Subsidiary Risks: 8
UN Packing Group: II
Signal: Danger
Corr-Skull-Health haz
Toxic if swallowed
Toxic in contact with skin
Causes severe skin burns and eye damage
Causes damage to the central nervous system and blood cells
Causes damage to nervous system and blood cells through prolonged or repeated exposure
Toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0030
Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

0-CRESOL

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE: COLOURLESS CRYSTALS, WITH CHARACTERISTIC ODOUR. TURNS DARK ON EXPOSURE TO AIR AND LIGHT.</th>
<th>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion. Serious local effects by all routes of exposure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>INHALATION RISK: A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</td>
</tr>
<tr>
<td>CHEMICAL DANGERS: Reacts violently with strong oxidants. The solution in water is a weak acid.</td>
<td>EFFECTS OF SHORT-TERM EXPOSURE: The substance is corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. Inhalation may cause lung oedema, but only after initial corrosive effects on eyes and/or airways have become manifest. The substance may cause effects on the central nervous system, resulting in lowering of consciousness. The substance may cause effects on the blood, resulting in destruction of blood cells. Exposure far above the OEL may result in death. Medical observation is indicated.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV: 5 ppm as TWA (skin) (ACGIH 2008). MAK: skin absorption (H); Carcinogen category: 3A; BAT issued; (DFG 2008).</td>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</td>
</tr>
<tr>
<td>OSHA PEL: TWA 5 ppm (22 mg/m³) skin</td>
<td></td>
</tr>
<tr>
<td>NIOSH REL: TWA 2.3 ppm (10 mg/m³)</td>
<td></td>
</tr>
<tr>
<td>NIOSH IDLH: 250 ppm See: cresol</td>
<td></td>
</tr>
</tbody>
</table>

http://www.cdc.gov/niosh/ipcsneng/neng0030.html
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the nervous system, resulting in impaired functions. The substance may have effects on the blood, resulting in anaemia.

| PHYSICAL PROPERTIES       | Boiling point: 191°C  
Melting point: 31°C  
Density: 1.05 g/cm³  
Solubility in water, g/100 ml at 25°C: 2.5 (moderate)  
Vapour pressure, Pa at 25°C: 33 |
|---------------------------|--------------------------------------------------|
|                           | Relative vapour density (air = 1): 3.7  
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00  
Flash point: 81°C c.c.  
Auto-ignition temperature: 555°C  
Explosive limits, vol% in air: 1.3-?  
Octanol/water partition coefficient as log Pow: 1.95 |

| ENVIRONMENTAL DATA         | The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment. |

**NOTES**

Transport Emergency Card: TEC (R)-61GTC2-II  
NFPA Code: H 3; F 2; R 0;  

**ADDITIONAL INFORMATION**

**ICSC: 0030**  
o-CRESOL  
(C) IPCS, CEC, 1994  

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# International Chemical Safety Cards

## 2-NITROPHENOL

ICSC: 0523

<table>
<thead>
<tr>
<th></th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Dry powder. Carbon dioxide. Water spray. Alcohol-resistant foam.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Local exhaust or breathing protection.</td>
<td></td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Personal protection: P2 filter respirator for harmful particles. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers.

## STORAGE

Store in an area without drain or sewer access. Separated from strong oxidants, strong bases, strong acids, food and feedstuffs.

## PACKAGING & LABELLING

Do not transport with food and feedstuffs.

- UN Hazard Class: 6.1
- UN Packing Group: III
# International Chemical Safety Cards

## 2-NITROPHENOL

### PHYSICAL STATE; APPEARANCE:
YELLOW CRYSTALS

### PHYSICAL DANGERS:

### CHEMICAL DANGERS:
The substance decomposes on burning producing toxic and corrosive fumes including nitrogen oxides. Reacts with strong acids, strong bases and strong oxidants.

### OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK not established.

### PHYSICAL PROPERTIES
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>216°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>45-46°C</td>
</tr>
<tr>
<td>Density</td>
<td>1.49 g/cm³</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>210 g/100 ml at 20°C (poor)</td>
</tr>
<tr>
<td>Vapour pressure, kPa at 25°C</td>
<td>0.015</td>
</tr>
<tr>
<td>Flash point</td>
<td>108°C c.c.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>550°C</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow</td>
<td>1.79</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA
The substance is harmful to aquatic organisms.

### NOTES
Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available.

Transport Emergency Card: TEC (R)-61S1663 or 61GT2-III

### ADDITIONAL INFORMATION

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**IMPORTANT LEGAL NOTICE:**

IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
### International Chemical Safety Cards

#### 4-NITROANILINE

**ICSC:** 0308

**p-Nitroaniline**

**1-Amino-4-nitrobenzene**

C.I. 37035

C₆H₆N₂O₂

Molecular mass: 138.1

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPOTMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Many reactions may cause fire or explosion.</td>
<td>NO open flames. NO contact with combustible substances.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>(Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

**STORAGE**

**PACKAGING & LABELLING**

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Wash away remainder with plenty of water. (Extra personal protection: P3 filter respirator for toxic particles.) Do NOT let this chemical enter the environment.

Separated from strong acids, strong oxidants, combustible and reducing substances, food and feedstuffs. Dry.

Do not transport with food and feedstuffs.

Note: C T symbol
R: 23/24/25-33-52/53
S: 1/2-28-37-45-61
UN Hazard Class: 6.1
UN Packing Group: II

---

**S E E I M P O R T A N T I N F O R M A T I O N O N B A C K**

**ICSC: 0308**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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**International Chemical Safety Cards**

**4-NITROANILINE**

**ICSC: 0308**

**PHYSICAL STATE; APPEARANCE:**
YELLOW CRYSTALS OR POWDER.

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
May explode on heating. On combustion, forms toxic fumes of nitrogen oxides. Reacts with strong acids, strong oxidants and strong reducing agents. Reacts with organic materials in presence of moisture causing fire hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 3 mg/m³ (as TWA) (skin) A4 (not classifiable as a human carcinogen); BEI issued (ACGIH 2005).
MAK: skin absorption (H); Carcinogen category: 3A (DFG 2005).
OSHA PEL*: TWA 6 mg/m³ (1 ppm) skin
NIOSH REL: TWA 3 mg/m³ skin
NIOSH IDLH: 300 mg/m³ See: 100016

**PHYSICAL PROPERTIES**
Boiling point: 332°C
Melting point: 148°C
Density: 1.4 g/cm³
Solubility in water, g/100 ml at 18.5°C: 0.08

**ENVIRONMENTAL DATA**
The substance is harmful to aquatic organisms. Do not let this chemical enter the environment.

---

**NOTES**
Depending on the degree of exposure, periodic medical examination is indicated. Specific treatment is necessary in case

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* See important information on back
of poisoning with this substance; the appropriate means with instructions must be available. Also consult ICSC 0306 2-
Nitroaniline, and ICSC 0307 3-Nitroaniline.

Transport Emergency Card: TEC (R)-61G12b

NFPA Code: H 3; F 1; R 2;

ADDITIONAL INFORMATION

ICSC: 0308

4-NITROANILINE

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cards with the relevant legislation in the country of use. The only modifications made to produce the
U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

## 3,3'-DICHLOOROBENZIDINE

<table>
<thead>
<tr>
<th>ICSC: 0481</th>
</tr>
</thead>
</table>

3,3'-Dichlorobiphenyl-4,4'-ylenediamine  
4,4'-Diamino-3,3'-dichlorobiphenyl  
C₆H₃ClNH₂C₆H₃ClNH₂/C₁₂H₁₀Cl₂N₂  
Molecular mass: 253.1

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0481</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>91-94-1</td>
</tr>
<tr>
<td>RTECS #</td>
<td>DD0525000</td>
</tr>
<tr>
<td>EC #</td>
<td>612-068-00-4</td>
</tr>
<tr>
<td>Validated</td>
<td>May 05, 2010</td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO open flames. Fine water spray, Dry powder. Carbon dioxide.</td>
</tr>
</tbody>
</table>

### EXPLOSION

See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. PREVENT DISPERSION OF DUST! STRICT HYGIENE!

### INHALATION

Cough. Sore throat. Avoid inhalation of dust. Local exhaust or breathing protection. Fresh air, rest. Seek medical attention if you feel unwell.

### SKIN

MAY BE ABSORBED! Protective gloves. Protective clothing. Remove contaminated clothes. Rinse and then wash skin with water and soap. Seek medical attention if you feel unwell.

### EYES

Face shield or eye protection in combination with breathing protection if powder. Rinse with plenty of water (remove contact lenses if easily possible).

### INGESTION

Do not eat, drink, or smoke during work. Rinse mouth. Refer for medical attention.

### SPILLAGE DISPOSAL

Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Use scalable.

### STORAGE

Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Well closed. Store in original container. Store in an area without drain or sewer access. Replaced by 22211100 in update May 2010.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Note: E  
T symbol  
N symbol  
R: 45-21-43-50/53  
S: 53-45-60-61  
Signal: Danger  
Excl mark-Health haz-Enviro

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http://www.cdc.gov/niosh/ipcsneng/neng0481.html

12/9/2011
International Chemical Safety Cards

3,3’-DICHLOROBENZIDINE

ICSC: 0481

PHYSICAL STATE; APPEARANCE: GREY TO PURPLE CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS: The substance decomposes on burning producing toxic and corrosive fumes including nitrogen oxides and hydrogen chloride. update May 2010 and replaced by 13347000 according to the CG

INHALATION DANGERS: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed, especially if powdered.

INHALATION RISK: The substance is irritating to the respiratory tract. update May 2010 and replaced by 13709030

EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the respiratory tract. update May 2010 and replaced by 13709030

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 368°C
Melting point: 132-133°C
Solubility in water: (none)

Auto-ignition temperature: 350°C
Octanol/water partition coefficient as log Pow: 3.51

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment. 0 added

NOTES

The substance is combustible but no flash point is available in literature. Curithane C126 is a trade name.

ADDITIONAL INFORMATION
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### International Chemical Safety Cards

#### 3-NITROANILINE

**ICSC:** 0307

**m-Nitroaniline**  
1-Amino-3-nitrobenzene  
C.I. 37030  
C₆H₆N₂O₂  
Molecular mass: 138.1

---

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Many reactions may cause fire or explosion.</td>
<td>NO open flames. NO contact with combustible substances.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td></td>
<td>Face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>(Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.</td>
</tr>
</tbody>
</table>

---

**SPILLAGE DISPOSAL** | **STORAGE** | **PACKAGING & LABELLING**
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder. (Extra personal protection: P3 filter respirator for toxic particles.) Do NOT let this chemical enter the environment.

Separated from strong acids, strong oxidants, combustible and reducing substances, food and feedstuffs. Dry.

Do not transport with food and feedstuffs.

Note: C
T symbol
R: 23/24/25-33-52/53
S: 1/2-28-36/37-45-61
UN Hazard Class: 6.1
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0307

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

3-NITROANILINE

ICSC: 0307

PHYSICAL STATE; APPEARANCE: YELLOW CRYSTALS.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On combustion, forms toxic fumes of nitrogen oxides. Reacts with strong acids, strong oxidants and strong reducing agents. Reacts with organic materials in presence of moisture causing fire hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

PHYSICAL PROPERTIES
Boiling point (decomposes): 306°C
Melting point: 114°C
Density: 1.4 g/cm³

Solubility in water, g/100 ml at 25°C: 0.089
Vapour pressure, Pa at 25°C: 0.005
Octanol/water partition coefficient as log Pow: 1.37

ENVIRONMENTAL DATA
The substance is harmful to aquatic organisms. Do not let this chemical enter the environment.

NOTES
Depending on the degree of exposure, periodic medical examination is indicated. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Also consult ICSC 0306 2-Nitroaniline, and ICSC 0308 4-Nitroaniline.

http://www.cdc.gov/niosh/ipcsneng/neng0307.html

12/9/2011
Transport Emergency Card: TEC (R)-61G12b

NFPA Code: H3; F1; R2;

ADDITIONAL INFORMATION

ICSC: 0307

3-NITROANILINE

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# International Chemical Safety Cards

## DINITRO-o-CRESOL

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with oxidants.</td>
<td>Water spray, foam, dry powder, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Finely dispersed particles form explosive mixtures in air. Risk of fire and explosion on contact with oxidants.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>MAY BE ABSORBED! Yellow stain. (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. Vomiting. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention.</td>
</tr>
</tbody>
</table>

ICSC: 0462
CAS #: 534-52-1
RTECS #: GO9625000
UN #: 1598
EC #: 609-020-00-X
April 19, 2004 Validated
### SPILLAGE DISPOSAL
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: chemical protection suit including self-contained breathing apparatus.

### STORAGE
Separated from strong oxidants, food and feed stuffs. Well closed.

### PACKAGING & LABELLING
Do not transport with food and feedstuffs. T+ symbol
N symbol
R: 26/27/28-38-41-44-50/53-68
S: 1/2-36/37-45-60-61
UN Hazard Class: 6.1
UN Packing Group: II

---

**ICSC: 0462**

**International Chemical Safety Cards**

**DINITRO-o-CRESOL**

**PHYSICAL STATE; APPEARANCE:**
ODOURLESS, YELLOW CRYSTALS

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic fumes including nitrogen oxides. Reacts violently with strong oxidants.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.2 mg/m³ as TWA; (skin); (ACGIH 2004).
MAK: IIb (not established but data is available); skin absorption (H); (DFG 2004).
OSHA PEL: TWA 0.2 mg/m³ skin
NIOSH REL: TWA 0.2 mg/m³ skin
NIOSH IDLH: 5 mg/m³ See: [534521](http://www.cdc.gov/niosh/ipcsneng/neng0462.html)

**ROUTES OF EXPOSURE:**
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:**
A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is corrosive to the eyes and is irritating to the skin. Yellow staining of the skin. The substance may cause effects on the metabolic rate. Exposure at high levels may result in death.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

**PHYSICAL PROPERTIES**
- Boiling point: 312°C
- Melting point: 87.5°C
- Density: 1.58 g/cm³
- Solubility in water, g/100 ml at 20°C: 0.694

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms.

**NOTES**
Do NOT take working clothes home. Antinonnin, Detal, Dinitrol, Elgetol, Lipan, Selinon and Effusan are trade names. Technical grade may cause skin sensitization.

Transport Emergency Card: TEC (R)-61S1598 or 61GT2-II

ADDITIONAL INFORMATION

ICSC: 0462  DINITRO-o-CRESOL

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4-Bromodiphenyl ether

Product Number : B65209
Brand : Aldrich

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C12H9BrO
Molecular Weight : 249.1 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>101-55-3</td>
<td>202-952-4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion., Skin sensitizer, Irritant

HMIS Classification
Health Hazard: 2
Flammability: 1
Physical hazards: 0

NFPA Rating
Health Hazard: 2
Fire: 1
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.
Ingestion: Harmful if swallowed.

4. FIRST AID MEASURES
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point > 113.0 °C (> 235.4 °F) - closed cup
Ignition temperature no data available

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods for cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
**Hand protection**  
Handle with gloves.

**Eye protection**  
Safety glasses

**Skin and body protection**  
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**  
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance**
- **Form**: liquid
- **Colour**: colourless

**Safety data**
- **pH**: no data available
- **Melting point**: 18 °C (64 °F)
- **Boiling point**: 305 °C (581 °F)
- **Flash point**: > 113.0 °C (> 235.4 °F) - closed cup
- **Ignition temperature**: no data available
- **Lower explosion limit**: no data available
- **Upper explosion limit**: no data available
- **Density**: 1.423 g/mL at 25 °C (77 °F)
- **Water solubility**: no data available
- **Partition coefficient**: log Pow: 4.34

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**10. STABILITY AND REACTIVITY**

**Storage stability**  
Stable under recommended storage conditions.

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen bromide gas

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**11. TOXICOLOGICAL INFORMATION**

**Acute toxicity**
no data available

**Irritation and corrosion**
no data available
Sensitisation
May cause sensitization by skin contact.

Chronic exposure
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects
Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Harmful if swallowed.

12. ECOLOGICAL INFORMATION
Elimination information (persistence and degradability)
no data available

Ecotoxicity effects
Toxicity to fish LC50 - Lepomis macrochirus (Bluegill) - 50.90 mg/l - 24 h
LC50 - Lepomis macrochirus (Bluegill) - 9.60 mg/l - 48 h

Further information on ecology
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS
Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION
DOT (US)
UN-Number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s.
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 3082  Class: 9  Packing group: III  EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (4-Bromophenyl phenyl ether)
Marine pollutant: No

IATA
UN-Number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid n.o.s. (4-Bromophenyl phenyl ether)

15. REGULATORY INFORMATION

OSHA Hazards
Harmful by ingestion., Skin sensitizer, Irritant

DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

4-Bromophenyl phenyl ether  CAS-No.  101-55-3

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
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<tr>
<td>101-55-3</td>
<td>1989-12-01</td>
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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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</tr>
</thead>
<tbody>
<tr>
<td>101-55-3</td>
<td>1989-12-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## 4-CHLORO-m-CRESOL

**ICSC: 0131**

- **p-Chloro-m-cresol**
- 2-Chloro-5-hydroxytoluene
- 4-Chloro-3-methylphenol
- C<sub>7</sub>H<sub>7</sub>ClO / C<sub>6</sub>H<sub>3</sub>OHCH<sub>3</sub>Cl
- Molecular mass: 142.58

| ICSC #   | 0131 |
| CAS #    | 59-50-7 |
| RTECS #  | GO7100000 |
| UN #     | 2669 |
| EC #     | 604-014-00-3 |
| June 10, 1997 Validated |

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPOTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Water spray, powder.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>INHALATION</strong></td>
<td>Cough. Sore throat. (See Ingestion).</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>• <strong>SKIN</strong></td>
<td>Redness. Pain.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td>• <strong>EYES</strong></td>
<td>Redness. Pain. Severe deep burns.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting, then remove to safe place. Do NOT let this chemical enter</td>
<td>Separated from food and feedstuffs.</td>
<td>Xn symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: 21/22-41-43-50</td>
</tr>
</tbody>
</table>

[^CDC NIOSH]: http://www.cdc.gov/niosh/ipcsneng/neng0131.html
4-CHLORO-m-CRESOL

ICSC: 0131

**PHYSICAL STATE: APPEARANCE:**
WHITE OR SLIGHTLY PINK, HYGROSCOPIC CRYSTALS OR CRYSTALLINE POWDER.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on burning producing toxic and corrosive fumes including hydrogen chloride and phosgene.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.
MAK: IIb (not established but data is available); sensitization of skin (Sh); (DFG 2005).

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance is irritating to the eyes, the skin and the respiratory tract.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact may cause skin sensitization.

**PHYSICAL PROPERTIES**
- Boiling point: 235°C
- Melting point: 66°C
- Density: 1.4 g/cm³
- Solubility in water, g/100 ml at 20°C: 0.38
- Flash point: 118°C
- Auto-ignition temperature: 590°C
- Octanol/water partition coefficient as log Pow: 3.1

**ENVIRONMENTAL DATA**
The substance is toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

**NOTES**
Aptal, Baktolan, Parmetol, Raschit are trade names. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

Transport Emergency Card: TEC (R)-61GT2-II

http://www.cdc.gov/niosh/ipcsneng/neng0131.html

12/9/2011
ICSC: 0131  
4-CHLORO-m-CRESOL  
(C) IPCS, CEC, 1994  

IMPORTANT LEGAL NOTICE: Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

### 4-CHLOROANILINE

ICSC: 0026

Chloroaminobenzene, p-
Chloroaniline, p-
C₆H₆ClN / ClC₆H₄NH₂

Molecular mass: 127.6

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0026</th>
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</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>106-47-8</td>
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<tr>
<td>RTECS #</td>
<td><strong>BX0700000</strong></td>
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<tr>
<td>UN #</td>
<td>2018</td>
</tr>
<tr>
<td>EC #</td>
<td>612-137-00-9</td>
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<td>October 18, 2001 Validated</td>
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</table>

#### TYPES OF HAZARD/EXPOSURE

<table>
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<tr>
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<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
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</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
</tr>
</tbody>
</table>

#### EXPLOSION

- **PREVENT DISPERSION OF DUST!** **STRICT HYGIENE!**
- IN ALL CASES CONSULT A DOCTOR!

#### INHALATION

- Local exhaust or breathing protection.
- Fresh air, rest. Refer for medical attention.

#### SKIN

- MAY BE ABSORBED! (Further see Inhalation).
- Protective gloves. Protective clothing.
- Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

#### EYES

- Redness. Pain.
- Safety goggles, or eye protection in combination with breathing protection.
- First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

#### INGESTION

- (See Inhalation).
- Do not eat, drink, or smoke during work.
- Rinse mouth. Refer for medical attention.

#### SPILLAGE DISPOSAL

- Personal protection: particulate filter respirator adapted to the airborne concentration of the substance.
- Chemical protection suit. Sweep spilled substance into sealable containers; if

#### STORAGE

- Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access.

#### PACKAGING & LABELLING

- Do not transport with food and feedstuffs.
- Note: E
- T symbol
- N symbol

---

appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

**ICSC: 0026**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

**International Chemical Safety Cards**

**4-CHLOROANILINE**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>N</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL STATE: APPEARANCE: COLOURLESS TO YELLOW CRYSTALS, WITH CHARACTERISTIC ODOUR.</td>
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<tr>
<td>PHYSICAL DANGERS:</td>
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<tr>
<td>CHEMICAL DANGERS: The substance decomposes on burning producing toxic and corrosive fumes including hydrogen chloride, nitrogen oxides. Reacts violently with oxidants.</td>
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<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV not established.</td>
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<tr>
<td>MAK: skin absorption (H); sensitization of skin (Sh); Carcinogen category: 2 (DFG 2009).</td>
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<tr>
<td>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</td>
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</tr>
<tr>
<td>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed.</td>
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<td></td>
</tr>
<tr>
<td>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes. The substance may cause effects on the red blood cells, resulting in lesions of blood cells and formation of methaemoglobin. Medical observation is indicated. The effects may be delayed.</td>
<td></td>
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</tr>
<tr>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the spleen. Tumours have been detected in experimental animals but may not be relevant to humans (see Notes).</td>
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</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 232°C
- Melting point: 69-72.5°C
- Relative density (water = 1): 1.4
- Solubility in water, g/100 ml at 20°C: 0.39
- Vapour pressure, Pa at 20°C: 2
- Relative vapour density (air = 1): 4.4
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00
- Flash point: 120-123°C o.c.
- Auto-ignition temperature: 685°C
- Octanol/water partition coefficient as log Pow: 1.8

**ENVIROMENTAL DATA**

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available.

Transport Emergency Card: TEC (R)-61S2018
Card has been partially updated in April 2010: see Occupational Exposure Limits.
### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>ICSC: 0026</th>
<th>4-CHLOROANILINE</th>
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SIGMA-ALDRICH

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: 4-Chlorodiphenyl ether
Product Number: 357650
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: 4-Chlorophenyl phenyl ether
Formula: C_{12}H_{9}ClO
Molecular Weight: 204.65 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Chloro-4-phenoxybenzene</td>
<td>7005-72-3</td>
<td>230-281-7</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion., Skin sensitizer, Irritant

HMIS Classification
Health Hazard: 2
Flammability: 1
Physical hazards: 0

NFPA Rating
Health Hazard: 3
Fire: 1
Reactivity Hazard: 0

Potential Health Effects

Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.
4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point 113.0 °C (235.4 °F) - closed cup

Ignition temperature no data available

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods for cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour colourless

Safety data
pH no data available
Melting point no data available
Boiling point 161 - 162 °C (322 - 324 °F) at 25 hPa (19 mmHg)

Flash point 113.0 °C (235.4 °F) - closed cup
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Density 1.193 g/mL at 25 °C (77 °F)

Water solubility no data available
Partition coefficient: n-octanol/water log Pow: 4.20

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Materials to avoid
Strong oxidizing agents
Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
no data available
Irritation and corrosion
no data available
Sensitisation
May cause sensitization by skin contact.

Chronic exposure

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Harmful if swallowed.

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)
no data available

Ecotoxicity effects

Toxicity to fish LC50 - other fish - 0.73 mg/l - 96 h

Further information on ecology
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS
Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (1-Chloro-4-phenoxybenzene)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Harmful by ingestion., Skin sensitizer, Irritant

TSCA Status
On TSCA Inventory

DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

<table>
<thead>
<tr>
<th>1-Chloro-4-phenoxybenzene</th>
<th>CAS-No.</th>
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<tbody>
<tr>
<td>1-Chloro-4-phenoxybenzene</td>
<td>7005-72-3</td>
</tr>
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SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## p-NITROPHENOL

**ICSC:** 0066

| 4-Nitrophenol |
| 4-Hydroxynitrobenzene |
| C₆H₅NO₃ |

Molecular mass: 139.1

**ICSC #** 0066  
**CAS #**  100-02-7  
**RTECS #** SM2275000  
**UN #**  1663  
**EC #**  609-015-00-2  
November 25, 1998 Validated

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIREFIGHTING</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
</tbody>
</table>

**EXPLOSION**  
Finely dispersed particles form explosive mixtures in air.  
Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.  
In case of fire: keep drums, etc., cool by spraying with water.

## EXPOSURE

**PREVENT DISPERSION OF DUST! STRICT HYGIENE!**

**•INHALATION**  
Local exhaust or breathing protection.  
Fresh air, rest. Refer for medical attention.

**•SKIN**  
MAY BE ABSORBED! Redness. (Further see Inhalation).  
Protective gloves. Protective clothing.  
Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

**•EYES**  
Redness. Pain.  
Safety spectacles, face shield or eye protection in combination with breathing protection.  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**•INGESTION**  
Do not eat, drink, or smoke during work.  
Rinse mouth. Rest. Refer for medical attention.

## SPILLAGE DISPOSAL

Sweep spilled substance into sealable

## STORAGE

Separated from combustible and

## PACKAGING & LABELLING

Do not transport with food and
containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P2 filter respirator for harmful particles. reducing substances, food and feedstuffs. Well closed.

**ICSC: 0066**

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

**International Chemical Safety Cards**

**p-NITROPHENOL**

<table>
<thead>
<tr>
<th>PHYSICAL STATE: APPEARANCE:</th>
<th>COLOURLESS TO PALE YELLOW CRYSTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>Dust explosion possible if in powder or granular form, mixed with air.</td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>May explode on heating. The substance decomposes on heating producing toxic fumes including nitrogen oxides. Mixtures with potassium hydroxide are explosive.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV not established.</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point (decomposes): 279°C
- Melting point: 111-116°C
- Density: 1.5 g/cm³
- Solubility in water, g/100 ml at 20°C: 1.24
- Vapour pressure, Pa at 20°C: 0.0032
- Flash point: 169°C
- Auto-ignition temperature: 490°C
- Octanol/water partition coefficient as log Pow: 1.91

**ENVIRONMENTAL DATA**

The substance is toxic to aquatic organisms.

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Card has been partly updated in April 2005. See section Physical properties.

Transport Emergency Card: TEC (R)-61S1663

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http://www.cdc.gov/niosh/ipcsneng/neng0066.html
| IMPORTANT LEGAL NOTICE: | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |

ICSC: 0066 | p-NITROPHENOL |

(C) IPCS, CEC, 1994
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: 4-Nitroquinoline N-oxide

Product Number: N8141
Brand: Aldrich
Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

GHS Classification
Carcinogenicity (Category 1B)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger
Hazard statement(s)
H350 May cause cancer.
Precautionary statement(s)
P201 Obtain special instructions before use.
P308 + P313 IF exposed or concerned: Get medical advice/attention.

HMIS Classification
Health hazard: 0
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
Eyes: May cause eye irritation.
Ingestion: May be harmful if swallowed.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: 4-Nitroquinoline 1-oxide

Formula: C₉H₆N₂O₃
Molecular Weight: 190.16 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>56-57-5</td>
<td>200-281-1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOₓ)

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature: -20 °C

Light sensitive. hygroscopic
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form crystalline
Colour yellow

Safety data
pH no data available
Melting point/freezing point Melting point/range: 154 - 156 °C (309 - 313 °F) - lit.
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density no data available
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
Odour no data available
Odour Threshold no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
LD50 Subcutaneous - rat - 12.6 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
Possible human carcinogen

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

- **Inhalation**: May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion**: May be harmful if swallowed.
- **Skin**: May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes**: May cause eye irritation.

**Signs and Symptoms of Exposure**
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**
no data available

**Additional Information**
RTECS: VC2100000

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**
no data available

**Persistence and degradability**
no data available

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**
no data available

---

**13. DISPOSAL CONSIDERATIONS**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**DOT (US)**
Not dangerous goods
IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>56-57-5</td>
<td>1989-08-11</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>56-57-5</td>
<td>1989-08-11</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
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# 1,2-Dihydroacenaphthylene

**Chemical Name:** 1,2-Dihydroacenaphthylene

**CAS Number:** 83-32-9

**Molecular Formula:** C₁₂H₁₀

**Molecular Mass:** 154.2

## Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Types of Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fire</strong></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Water spray. Dry powder. Foam. Carbon dioxide.</td>
</tr>
<tr>
<td><strong>Explosion</strong></td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
<tr>
<td><strong>Exposure</strong></td>
<td>See NOTES.</td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
<td></td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td>Safety goggles</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td><strong>Ingestion</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth.</td>
<td></td>
</tr>
</tbody>
</table>

## Spillage Disposal

Personal protection: P2 filter respirator for harmful particles. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

## Storage

Separated from strong oxidants. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

## Packaging & Labelling

- UN Hazard Class: 9
- UN Packing Group: III
- Signal: Warning
- Enviro
- Very toxic to aquatic life with long lasting effects

[http://www.cdc.gov/niosh/ipcsneng/neng1674.html](http://www.cdc.gov/niosh/ipcsneng/neng1674.html)
### ACENAPHTHENE

**ICSC: 1674**

**PHYSICAL STATE; APPEARANCE:**
WHITE TO BEIGE CRYSTALS

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
On combustion, forms toxic gases including carbon monoxide. Reacts with strong oxidants.

**PHYSICAL PROPERTIES**
- Boiling point: 279°C
- Melting point: 95°C
- Density: 1.2 g/cm³
- Solubility in water, g/100 ml at 25°C: 0.0004

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.

**NOTES**

Acenaphthene occurs as a pure substance and also as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

Transport Emergency Card: TEC (R)-90GM7-III

**ADDITIONAL INFORMATION**

**ICSC: 1674**

ACENAPHTHENE
IMPORTANT LEGAL NOTICE:
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Acenaphthylene
Product Number: 416703
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning

Hazard statement(s)
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P305 + P 351 + P 338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 1
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 1
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS
4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form solid

Safety data
pH no data available
Melting point 78 - 82 °C (172 - 180 °F) - lit.
Boiling point 280 °C (536 °F) - lit.
Flash point 122.0 °C (251.6 °F) - closed cup
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Density 0.899 g/mL at 25 °C (77 °F)
Water solubility no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - mouse - 1,760 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available
Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>May be harmful if inhaled. May cause respiratory tract irritation.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>May be harmful if swallowed.</td>
</tr>
<tr>
<td>Skin</td>
<td>May be harmful if absorbed through skin. May cause skin irritation.</td>
</tr>
<tr>
<td>Eyes</td>
<td>May cause eye irritation.</td>
</tr>
</tbody>
</table>

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: AB1254000

12. ECOLOGICAL INFORMATION

Toxicity
no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3077  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Acenaphthylene)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Acenaphthylene  CAS-No.  208-96-8

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Acenaphthylene  CAS-No.  208-96-8  Revision Date

New Jersey Right To Know Components

Acenaphthylene  CAS-No.  208-96-8  Revision Date

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## ANILINE

### Benzeneamine
Aminobenzene
Phenylamine

C₆H₇N / C₆H₅NH₂

Molecular mass: 93.1

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with oxidants.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 70°C explosive vapour/air mixtures may be formed.</td>
<td>Above 70°C use a closed system, ventilation.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
</tbody>
</table>

### EXPOSURE

**•INHALATION**

Ventilation, local exhaust, or breathing protection.

Fresh air, rest. Refer for medical attention.

**•SKIN**
MAY BE ABSORBED!
Redness. (Further see Inhalation).

Protective gloves. Protective clothing.

Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

**•EYES**
Redness. Pain.

Face shield, or eye protection in combination with breathing protection.

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**•INGESTION**
(Further see Inhalation).

Do not eat, drink, or smoke during work. Wash hands before eating.

Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention. See Notes.

### SPILLAGE DISPOSAL

### STORAGE

### PACKAGING & LABELLING

[ICSC:NENG0011 International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH](http://www.cdc.gov/niosh/ipcsneng/neng0011.html)
Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.

| Separated from strong oxidants, strong acids, food and feedstuffs. Well closed. | Do not transport with food and feedstuffs. | T symbol  
N symbol  
UN Hazard Class: 6.1  
UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0011**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## ANILINE

### PHYSICAL STATE; APPEARANCE:

**COLOURLESS OILY LIQUID, WITH CHARACTERISTIC ODOUR. TURNS BROWN ON EXPOSURE TO AIR OR LIGHT.**

### CHEMICAL DANGERS:

The substance decomposes on heating at temperatures above 190°C, producing toxic and corrosive fumes (ammonia and nitrogen oxides) and flammable vapours. The substance is a weak base. Reacts vigorously with strong oxidants causing fire and explosion hazard. Reacts violently with strong acids. Attacks copper and its alloys.

### OCCUPATIONAL EXPOSURE LIMITS:

- **TLV:** 2 ppm; (skin); A3; BEI issued; (ACGIH 2004).
- **MAK:** 2 ppm, 7.7 mg/m³; skin absorption (H); sensitization of skin (Sh);
- **Peak limitation category:** II(2); Carcinogen category: 4; Pregnancy risk group: C; (DFG 2006).
- **OSHA PEL:** TWA 5 ppm (19 mg/m³) skin
- **NIOSH REL:** Ca See Appendix A
- **NIOSH IDLH:** Ca 100 ppm See: 62533

### PHYSICAL PROPERTIES

- **Boiling point:** 184°C
- **Melting point:** -6°C
- **Relative density (water = 1):** 1.02
- **Solubility in water, g/100 ml at 20°C:** 3.4
- **Vapour pressure, Pa at 20°C:** 40
- **Relative vapour density (air = 1):** 3.2

### ROUTES OF EXPOSURE:

The substance can be absorbed into the body by inhalation, through the skin and by ingestion, also as a vapour!

### INHALATION RISK:

A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

### EFFECTS OF SHORT-TERM EXPOSURE:

The substance is irritating to the eyes and the skin. The substance may cause effects on the blood, resulting in the formation of methaemoglobin. Exposure at high levels may result in death. Medical observation is indicated. The effects may be delayed. See Notes.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the blood, resulting in formation of methaemoglobin.

### Flash point:

70°C c.c.

### Auto-ignition temperature:

615°C

### Explosive limits, vol% in air:

1.2-11

### Octanol/water partition coefficient as log Pow:

0.94

<table>
<thead>
<tr>
<th>ENVIRONMENTAL DATA</th>
<th>The substance is very toxic to aquatic organisms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTES</td>
<td>Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. The odour warning when the exposure limit value is exceeded is insufficient. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response. Card has been partly updated in October 2006. See Occupational Exposure Limits.</td>
</tr>
<tr>
<td></td>
<td>Transport Emergency Card: TEC (R)-61S1547</td>
</tr>
<tr>
<td></td>
<td>NFPA Code: H3; F2; R0;</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION</td>
<td></td>
</tr>
<tr>
<td>ICSC: 0011</td>
<td>ANILINE (C) IPCS, CEC, 1994</td>
</tr>
</tbody>
</table>

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ANTHRACENE

ICSC: 0825

Anthracin
Paranaphthalene
C_{14}H_{10} / (C_{6}H_{4}CH)_{2}
Molecular mass: 178.2

ICSC # 0825
CAS # 120-12-7
RTECS # CA9350000
March 24, 1999 Peer reviewed

TYPES OF HAZARD/EXPOSURE

ACUTE HAZARDS/SYMPTOMS

PREVENTION

FIRST AID/FIRE FIGHTING

FIRE
Combustible.
NO open flames.
Powder, water spray, foam, carbon dioxide.

EXPLOSION
Finely dispersed particles form explosive mixtures in air.
Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.
In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE

PREVENT DISPERSION OF DUST!

• INHALATION
Cough. Sore throat.
Ventilation (not if powder), local exhaust, or breathing protection.
Fresh air, rest. Refer for medical attention.

• SKIN
Redness.
Protective gloves.
Remove contaminated clothes. Rinse and then wash skin with water and soap.

• EYES
Redness. Pain.
Safety spectacles, face shield, or eye protection in combination with breathing protection if powder.
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

• INGESTION
Abdominal pain.
Do not eat, drink, or smoke during work.
Rinse mouth. Rest. Refer for medical attention.

SPILLAGE DISPOSAL

Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles).

STORAGE
Separated from strong oxidants. Well closed.

PACKAGING & LABELLING

R:
S:

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
The substance decomposes on heating, under influence of strong oxidants producing acrid, toxic fume, causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance slightly irritates the skin and the respiratory tract.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact with skin may cause dermatitis under the influence of UV light.

### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>342°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>218°C</td>
</tr>
<tr>
<td>Density, g/cm³</td>
<td>1.25-1.28</td>
</tr>
<tr>
<td>Solubility in water, g/100 ml at 20°C</td>
<td>0.00013</td>
</tr>
<tr>
<td>Vapour pressure, Pa at 25°C</td>
<td>0.08</td>
</tr>
<tr>
<td>Relative vapour density (air = 1)</td>
<td>6.15</td>
</tr>
<tr>
<td>Flash point</td>
<td>121°C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>538°C</td>
</tr>
<tr>
<td>Explosive limits, vol% in air</td>
<td>0.6-?</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow</td>
<td>4.5 (calculated)</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

### NOTES
Green oil, Tetra-olive N2G are trade names.

| NFPA Code: H0; F1; R; |

### ADDITIONAL INFORMATION

**ICSC: 0825**
(C) IPCS, CEC, 1994

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## International Chemical Safety Cards

### BENZ(a)ANTHRACENE

ICSC: 0385

1,2-Benzoanthracene  
Benzo(a)anthracene  
2,3-Benzphenanthrene  
Naphthanthracene  

\[ C_{18}H_{12} \]

Molecular mass: 228.3

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0385</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>56-55-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>CV9275000</td>
</tr>
<tr>
<td>EC #</td>
<td>601-033-00-9</td>
</tr>
<tr>
<td>October 23, 1995 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustible.</td>
<td>Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLOSION</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **INHALATION**  
  Local exhaust or breathing protection.  
  Fresh air, rest.

- **SKIN**  
  Protective gloves. Protective clothing.  
  Remove contaminated clothes. Rinse and then wash skin with water and soap.

- **EYES**  
  Safety goggles face shield or eye protection in combination with breathing protection.  
  First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**  
  Do not eat, drink, or smoke during work. Wash hands before eating.  
  Rinse mouth.

### SPILLAGE DISPOSAL

Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.

### STORAGE

Well closed.

### PACKAGING & LABELLING

- T symbol
- N symbol
- R: 45-50/53
- S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
<table>
<thead>
<tr>
<th>I M P O R T A N T  D A T A</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL STATE: APPEARANCE: COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.</td>
</tr>
<tr>
<td>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sublimation point: 435°C</td>
</tr>
<tr>
<td>Melting point: 162°C</td>
</tr>
<tr>
<td>Relative density (water = 1): 1.274</td>
</tr>
<tr>
<td>Solubility in water: none</td>
</tr>
<tr>
<td>Vapour pressure, Pa at 20°C: 292</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow: 5.61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioaccumulation of this chemical may occur in seafood.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetrathene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICSC: 0385</td>
</tr>
</tbody>
</table>

(C) IPCS, CEC, 1994

<table>
<thead>
<tr>
<th>IMPORTANT LEGAL NOTICE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</td>
</tr>
</tbody>
</table>
BENZO(a)PYRENE

Benz(a)pyrene
3,4-Benzopyrene
Benzo(d,e,f)chrysene
C_{20}H_{12}
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3
October 17, 2005 Peer reviewed

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPOMTS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.</td>
<td>AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!</td>
<td></td>
</tr>
<tr>
<td>• INHALATION</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBEd!</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Safety goggles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>
| Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. | Separated from strong oxidants. | T symbol
N symbol
R: 45-46-60-61-43-50/53
S: 53-45-60-61 |

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL STATE: APPEARANCE:**
PALE-YELLOW CRYSTALS

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Reacts with strong oxidants causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005).
MAK:
Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>496°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>178.1°C</td>
</tr>
<tr>
<td>Density</td>
<td>1.4 g/cm³</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>none (&lt;0.1 g/100 ml)</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>negligible</td>
</tr>
<tr>
<td>Octanol/water partition coefficient</td>
<td>log Pow: 6.04</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.

**NOTES**
Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

**ADDITIONAL INFORMATION**

**ICSC: 0104**

**BENZO(a)PYRENE**

(C) IPCS, CEC, 1994

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**BENZO(b)FLUORANTHENE**

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0720</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>205-99-2</td>
</tr>
<tr>
<td>RTECS #</td>
<td>CU1400000</td>
</tr>
<tr>
<td>EC #</td>
<td>601-034-00-4</td>
</tr>
</tbody>
</table>

March 25, 1999 Peer reviewed

**TYPES OF HAZARD/EXPOSURE**

**ACUTE HAZARDS/SYMPTOMS**

<table>
<thead>
<tr>
<th>FIRE</th>
<th>EXPLOSION</th>
<th>EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AVOID ALL CONTACT!</td>
</tr>
</tbody>
</table>

**PREVENTION**

In case of fire in the surroundings: use appropriate extinguishing media.

**FIRST AID/FIRE FIGHTING**

**FIRE**

In case of fire in the surroundings: use appropriate extinguishing media.

**EXPLOSION**

AVOID ALL CONTACT!

**EXPOSURE**

- **INHALATION**
  - Local exhaust or breathing protection.
  - Remove contaminated clothes. Rinse and then wash skin with water and soap.

- **SKIN**
  - Protective gloves. Protective clothing.
  - First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **EYES**
  - Safety spectacles or eye protection in combination with breathing protection.
  - First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**
  - Do not eat, drink, or smoke during work.
  - Rinse mouth. Refer for medical attention.

**SPILLAGE DISPOSAL**

Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

**STORAGE**

Provision to contain effluent from fire extinguishing. Well closed.

**PACKAGING & LABELLING**

T symbol
N symbol
R: 45-50/53
S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

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**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: A2 (suspected human carcinogen); (ACGIH 2004).
MAK: Carcinogen category: 2; (DFG 2004).

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

---

**PHYSICAL PROPERTIES**

Boiling point: 481°C  
Melting point: 168°C  
Solubility in water: none  
Octanol/water partition coefficient as log Pow: 6.12

**ENVIRONMENTAL DATA**
This substance may be hazardous to the environment; special attention should be given to air quality and water quality.

---

**NOTES**

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

---

**ADDITIONAL INFORMATION**

**ICSC: 0720**

BENZO(b)FLUORANTHENE

(C) IPCS, CEC, 1994

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**IMPORTANT LEGAL NOTICE:**
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**BENZO(g,h,i)FLUORANTHENE**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Water spray, powder.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td></td>
<td>Local exhaust or breathing protection.</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>MAY BE ABSORBED!</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td></td>
<td>Safety goggles, face shield, or eye protection in combination with breathing protection if powder.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

**STORAGE**
Well closed.

**PACKAGING & LABELLING**
R: 
S: 

***SEE IMPORTANT INFORMATION ON BACK***

International Chemical Safety Cards

BENZO(g,h,i)FLUORANTHENE

**PHYSICAL STATE; APPEARANCE:**
YELLOW CRYSTALS

**PHYSICAL DANGERS:**
The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

**REFERENCES:**
Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**CHEMICAL DANGERS:**
The substance decomposes on heating producing toxic fumes.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.

**PHYSICAL PROPERTIES**
- Melting point: 149°C
- Solubility in water: none
- Vapour pressure, Pa at 20°C: <10
- Relative vapour density (air = 1): 7.8
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0
- Octanol/water partition coefficient as log Pow: 7.23

**ENVIRONMENTAL DATA**
This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.

**NOTES**
Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Also consult ICSC #0720 and 0721.

**ADDITIONAL INFORMATION**

**ICSC: 0527**

**BENZO(g,h,i)FLUORANTHENE**

(C) IPCS, CEC, 1994

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## BENZO(k)FLUORANTHENE

**I**

**PHYSICAL STATE; APPEARANCE:**
YELLOW CRYSTALS

**REFERENCES:**

The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td></td>
<td></td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INHALATION</td>
<td>Local exhaust or breathing protection.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
<td></td>
</tr>
<tr>
<td>SKIN</td>
<td>Protective gloves. Protective clothing.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td>EYES</td>
<td>Safety spectacles or eye protection in combination with breathing protection if powder.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>
PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK:
Carcinogen category: 2;
(DFG 2004).

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES
Boiling point: 480°C
Melting point: 217°C
Solubility in water: none

Octanol/water partition coefficient as log Pow: 6.84

ENVIRONMENTAL DATA
This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish.

NOTES
Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0721

BENZO(k)FLUORANTHENE

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# International Chemical Safety Cards

## BENZYL ALCOHOL

ICSC: 0833

**Chemical Name:**
- Benzenemethanol
- Phenyl carbinol
- alpha-Hydroxytoluene
- Benzoyl alcohol
- Phenyl methanol

**Chemical Formula:**
- C\(_7\)H\(_8\)O / C\(_6\)H\(_5\)CH\(_2\)OH

**Molecular Mass:** 108.1

**ICSC #:** 0833  
**CAS #:** 100-51-6  
**RTECS #:** DN3150000  
**EC #:** 603-057-00-5  
**Validated:** April 13, 2000

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>ACUTE HAZARDS/SYMPOTMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Powder, AFFF, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. First rinse with plenty of water, then remove contaminated clothes and rinse again.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness.</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours.

## STORAGE

Separated from strong oxidants.

## PACKAGING & LABELLING

Xn symbol  
R: 20/22  
S: 2-26

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http://www.cdc.gov/niosh/ipcsneng/neng0833.html
## International Chemical Safety Cards

### BENZYL ALCOHOL

**ICSC: 0833**

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>N</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</td>
<td>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour and by ingestion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>INHALATION RISK: No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS: Reacts with strong oxidants. Attacks some forms of plastic. On combustion, forms toxic gases including carbon monoxide.</td>
<td>EFFECTS OF SHORT-TERM EXPOSURE: The aerosol irritates the eyes and the skin. The substance may cause effects on the nervous system.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV not established. MAK: IIb (not established but data is available); (DFG 2004).</td>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact may cause skin sensitization.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PHYSICAL PROPERTIES

- Boiling point: 205°C
- Melting point: -15°C
- Relative density (water = 1): 1.04
- Solubility in water, g/100 ml: 4
- Vapour pressure, Pa at 20°C: 13.2
- Relative vapour density (air = 1): 3.7
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0
- Flash point: 93°C c.c.
- Auto-ignition temperature: 436°C
- Explosive limits, vol% in air: 1.3-13
- Octanol/water partition coefficient as log Pow: 1.1

### ENVIRONMENTAL DATA

- The substance is toxic to aquatic organisms.

### NOTES

Card has been partly updated in October 2005. See section Occupational Exposure Limits.

NFPA Code: H 2; F 1; R 0;

### ADDITIONAL INFORMATION

- ICSC: 0833

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[http://www.cdc.gov/niosh/ipcsneng/neng0833.html](http://www.cdc.gov/niosh/ipcsneng/neng0833.html)
| IMPORTANT LEGAL NOTICE: | Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values. |
# International Chemical Safety Cards

**BUTYL BENZYL PHTHALATE**

ICSC: 0834

Benzyl butyl phthalate
1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester
BBP

$1_2\text{C}_6\text{H}_4(\text{COOCH}_2\text{C}_6\text{H}_5)(\text{COOC}_4\text{H}_9) / \text{C}_{19}\text{H}_{20}\text{O}_4$

Molecular mass: 312.4

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Alcohol-resistant foam. Powder, carbon dioxide. Water spray.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.</td>
<td>PREVENT GENERATION OF MISTS! AVOID EXPOSURE OF (PREGNANT) WOMEN!</td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Protective gloves.</td>
<td></td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety spectacles.</td>
<td></td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
<td>Rinse mouth.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

### STORAGE

Store in an area without drain or sewer access. Separated from strong oxidants.

### PACKAGING & LABELLING

Marine pollutant.
T symbol
N symbol
R: 61-62-50/53
S: 45-53-60-61
UN Hazard Class: 9
UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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**BUTYL BENZYL PHTHALATE**

<table>
<thead>
<tr>
<th>I</th>
<th>PHYSICAL STATE; APPEARANCE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>COLOURLESS OILY LIQUID</td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>PHYSICAL DANGERS:</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>CHEMICAL DANGERS:</td>
</tr>
<tr>
<td>A</td>
<td>The substance decomposes on burning producing toxic fumes. Reacts with oxidants.</td>
</tr>
<tr>
<td>N</td>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
</tr>
<tr>
<td>T</td>
<td>TLV not established.</td>
</tr>
<tr>
<td>D</td>
<td>MAK not established.</td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 370°C
- Melting point: -35°C
- Relative density (water = 1): 1.1
- Solubility in water: 0.71 mg/l (very poor)
- Vapour pressure, Pa at 20°C: negligible
- Relative vapour density (air = 1): 10.8
- Flash point: 198°C
- Auto-ignition temperature: 425°C
- Octanol/water partition coefficient as log Pow: 4.77

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.

**NOTES**

Sanitizer 160, Sicol 160, Unimoll BB and Palatinol BB are trade names.

Transport Emergency Card: TEC (R)-90GM6-III

NFPA Code: H1; F1; R0;

**ADDITIONAL INFORMATION**

**ICSC: 0834 BUTYL BENZYL PHTHALATE**

(C) IPCS, CEC, 1994

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1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY INFORMATION

Catalog Number: 204180

Product name: bis(2-CHLOROETHOXY)METHANE

Supplier: MP Biomedicals, LLC
29525 Fountain Parkway
Solon, OH 44139
tel: 440-337-1200

Emergency telephone number: CHEMTREC: 1-800-424-9300 (1-703-527-3887)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS Number</th>
<th>Weight %</th>
<th>ACGIH Exposure Limits</th>
<th>OSHA Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>bis(2-CHLOROETHOXY)METHANE</td>
<td>111-91-1</td>
<td>90 - 100%</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Toxic if swallowed. May be toxic by inhalation or skin contact.

Category of Danger: Toxic

Principle routes of exposure:
Skin
Inhalation: Harmful by inhalation.
Ingestion: Toxic if swallowed.
Skin contact: Harmful in contact with skin.
Eye contact: Risk of serious damage to eyes

Statements of hazard
Toxic if swallowed

Statement of Spill or Leak - ANSI Label
Eliminate all ignition sources. Absorb and/or contain spill with inert materials (e.g., sand, vermiculite). Then place in appropriate container. For large spills, use water spray to disperse vapors, flush spill area. Prevent runoff from entering waterways or sewers.

Statement of First Aid
If swallowed, do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Precautions - ANSI Label
Do not taste or swallow. Wash thoroughly after handling. Avoid breathing vapors. Avoid contact with skin, eyes and clothing

4. FIRST AID MEASURES

General advice: In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Inhalation: Move to fresh air. Call a physician immediately.

Skin contact: Rinse immediately with plenty of water and seek medical advice
**Ingestion:** Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Consult a physician if swallowed, seek medical advice immediately and show this container or label.

**Eye contact:** In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

**Protection of first-aiders:** No information available

**Medical conditions aggravated by exposure:** None known

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**5. FIRE FIGHTING MEASURES**

**Suitable extinguishing media:** Use dry chemical, CO2, water spray or "alcohol" foam

**Specific hazards:** Burning produces irritant fumes.

**Unusual hazards:** None known

**Special protective equipment for firefighters:** As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

**Specific methods:** Water mist may be used to cool closed containers.

**Flash point:** Not determined

**Autoignition temperature:** Not determined

**NFPA rating:**
- NFPA Health: 2
- NFPA Flammability: 0
- NFPA Reactivity: 0

---

**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions:** Use personal protective equipment.

**Environmental precautions:** Prevent product from entering drains.

**Methods for cleaning up:** Sweep up and shovel into suitable containers for disposal.

---

**7. HANDLING AND STORAGE**

**Storage:** ROOM TEMPERATURE

**Handling:** Use only in area provided with appropriate exhaust ventilation.

**Safe handling advice:** Wear personal protective equipment. Remove and wash contaminated clothing before reuse.

**Technical measures/storage conditions:** Keep containers tightly closed in a cool, well-ventilated place. Keep container tightly closed in a dry and well-ventilated place.

**Incompatible products:** Oxidising and spontaneously flammable products

---

**8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

**Engineering measures:** Ensure adequate ventilation.

**PERSONAL PROTECTIVE EQUIPMENT**

**Respiratory protection:** Breathing apparatus only if aerosol or dust is formed.

**Hand protection:** PVC or other plastic material gloves

**Skin and body protection:** Usual safety precautions while handling the product will provide adequate protection against this potential effect.

**Eye protection:** Safety glasses with side-shields

**Hygiene measures:** Handle in accordance with good industrial hygiene and safety practice.
9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Colorless
Physical state: Liquid
Formula: C5H10Cl2O2
Molecular weight: 173.05
Melting point/range: -33 °C
Boiling point/range: 218.1 °C
Density: 1.2339 at 20 °C (water = 1)
Vapor pressure: 0.1 mm Hg at 20 °C
Evaporation rate: No data available
Vapor density: 6.0 (air = 1)
Solubility (in water): Slightly soluble
Flash point: Not determined
Autoignition temperature: Not determined

10. STABILITY AND REACTIVITY

Stability: Stable under recommended storage conditions.
Polymerization: None under normal processing.
Hazardous decomposition products: Chloride/Hydrochloric acid
Materials to avoid: Strong oxidising agents
Conditions to avoid: Exposure to air or moisture over prolonged periods.

11. TOXICOLOGICAL INFORMATION

Product Information
Acute toxicity

Components
bis(2-CHLOROETHOXY)METHANE

RTECS Number: PA3675000
Selected LD50s and LC50s
Oral LD50 Rat: 65 mg/kg

Chronic toxicity: Chronic exposure may cause nausea and vomiting, higher exposure causes unconsciousness.
Local effects: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.
Specific effects: May include moderate to severe erythema (redness) and moderate edema (raised skin), nausea, vomiting, headache.
Primary irritation: No data is available on the product itself.
Carcinogenic effects: No data is available on the product itself.
Mutagenic effects: No data is available on the product itself.
Reproductive toxicity: No data is available on the product itself.

12. ECOLOGICAL INFORMATION

Mobility: No data available
Bioaccumulation: No data available
Ecotoxicity effects: No data available
Aquatic toxicity: May cause long-term adverse effects in the aquatic environment.

Components
bis(2-CHLOROETHOXY)METHANE

U.S. DOT - Appendix B - Marine Pollutan: Not Listed
U.S. DOT - Appendix B - Severe Marine Pollutants: Not Listed
United Kingdom - The Red List: Not Listed

Catalog Number: 204180
Product name: bis(2-CHLOROETHOXY)METHANE
13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products:
Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Residue from fires extinguished with this material may be hazardous.

Contaminated packaging:
Do not re-use empty containers

14. TRANSPORT INFORMATION

UN/Id No: 2810

DOT:
Proper shipping name: Toxic liquid, organic, n.o.s.
IATA Hazard Label(s): Toxic
Hazard Class 6.1 - Toxic substances - oral
Packing group: III

Emergency Response Guide Number (ERG): 153

Components U.S. DOT - Appendix A Table 1 - Reportable Quantities
bis(2-CHLOROETHOXY)METHANE RQ = 1000 pounds (454 kg); also listed as Dichloromethoxy ethane; also listed as Ethane, 1,1''-[methylenebis(oxy)]bis(2-chloro)-

TDG (Canada):
WHMIS hazard class: D1b toxic materials

IMDG/IMO
Proper shipping name: Toxic liquid, organic, n.o.s.
IMDG - Hazard Classifications Not Applicable
15. REGULATORY INFORMATION

International Inventories

Components
bis(2-CHLOROETHOXY)METHANE

Inventory - United States TSCA - Sect. 8(b) Present
California Proposition 65 Not Listed
Massachusetts Right to Know List: [present]
New Jersey Right to Know List: sn 2971
Pennsylvania Right to Know List: environmental hazard

U.S. regulations:
Components
bis(2-CHLOROETHOXY)METHANE
Florida substance List: [present]
Rhode Island Right to Know List: Not Listed
Illinois - Toxic Air Contaminants Not Listed
Connecticut - Hazardous Air Pollutants Not Listed

SARA 313 Notification:
The above is your notification as to the SARA 313 listing for this product(s) pursuant to Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

If you are unsure if you are subject to the reporting requirements of Section 313, or need more information, please call the EPA Emergency Planning and Community Right-To-Know Information Hotline: (800) 535-0202 or (202) 479-2499 (in Washington, DC or Alaska).

State Notification:
The above information is your notice as to the Right-to-Know listings of the stated product(s). Individual states will list chemicals for a variety of reasons including, but not limited to, the compounds toxicity; carcinogenic, tumorigenic and/or reproductive hazards; and the compounds environmental impact if accidentally released.
16. OTHER INFORMATION

Prepared by: Health & Safety

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End of Safety Data Sheet
International Chemical Safety Cards

BIS(2-CHLOROETHYL) ETHER

ICSC: 0417

Dichloroethyl ether
2,2'-Dichloroethyl ether
1,1'-Oxybis(2-chloro)ethane
Sym-Dichloroethyl ether
Diethylene glycol dichloride
C₄H₈Cl₂O / (ClCH₂CH₂)₂O
Molecular mass: 143.02

Types of Hazard/Exposure

<table>
<thead>
<tr>
<th></th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 55°C explosive vapour/air mixtures may be formed.</td>
<td>Above 55°C use a closed system, ventilation.</td>
<td>In case of fire: cool cylinder by spraying with water but avoid contact of the substance with water.</td>
</tr>
</tbody>
</table>

Exposure


• SKIN | MAY BE ABSORBED! | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. |

• EYES | Redness. Pain. | Face shield or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

<table>
<thead>
<tr>
<th><strong>SPILLAGE DISPOSAL</strong></th>
<th><strong>STORAGE</strong></th>
<th><strong>PACKAGING &amp; LABELLING</strong></th>
</tr>
</thead>
</table>
R: 10-26/27/28-40
S: 1/2-7/9-27-28-36/37-45
UN Hazard Class: 6.1
UN Subsidiary Risks: 3
UN Packing Group: II |

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0417

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

# International Chemical Safety Cards

**BIS(2-CHLOROETHYL) ETHER**

**ICSC: 0417**

**PHYSICAL STATE; APPEARANCE:** CLEAR, COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:** The vapour is heavier than air.

**CHEMICAL DANGERS:**
- The substance can form explosive peroxides on exposure to air and light. The substance decomposes on burning or on contact with water, producing toxic fumes including hydrogen chloride. Reacts with strong oxidants. Reacts violently with chlorosulfonic acid and oleum.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: 5 ppm as TWA, 10 ppm as STEL; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2004).
- MAK: 10 ppm, 59 mg/m³;
- Peak limitation category: I(1); skin absorption (H); (DFG 2004).
- OSHA PEL+: TWA 15 ppm (90 mg/m³) skin
- NIOSH REL: Ca TWA 5 ppm (30 mg/m³) ST 10 ppm (60 mg/m³) skin See Appendix A
- NIOSH IDLH: Ca 100 ppm See: 111444

**PHYSICAL PROPERTIES**
- Boiling point: 178°C
- Melting point: -50°C
- Relative density (water = 1): 1.22
- Vapour pressure, kPa at 25°C: 0.206
- Relative vapour density (air = 1): 4.9

**ROUTES OF EXPOSURE:**
- The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

**INHALATION RISK:** A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**
- The substance irritates the eyes and the respiratory tract. Inhalation of vapour may cause lung oedema (see Notes). Exposure far above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
- Repeated or prolonged contact with skin may cause dermatitis.

**FLASH POINT:** 55°C c.c.

**AUTO-IGNITION TEMPERATURE:** 369°C

**EXPLOSIVE LIMITS, VOL% IN AIR:** 2.7-?

**OCTANOL/WATER PARTITION COEFFICIENT AS LOG POW:** 1.29

---

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Check for peroxides prior to distillation; eliminate if found. DCEE, Chlorex are trade names. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-61GTF1-II

NFPA Code: H3; F2; R1;

**ADDITIONAL INFORMATION**

**ICSC: 0417**

BIS(2-CHLOROETHYL) ETHER

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

## DICHLOROISOPROPYL ETHER

**ICSC: 0435**

**Chemical Name:**

- Bis(2-chloro-1-methylethyl) ether
- 2,2'-Oxybis(1-chloropropane)
- Dichlorodiisopropyl ether

**Chemical Formula:**

C₆H₁₂Cl₂O / (ClCH₂C(CH₃)H)₂O

**Molecular Mass:** 171.1

**Identification Numbers:**

- ICSC # 0435
- CAS # 108-60-1
- RTECS # KN1750000
- UN # 2490

**Validated:** November 26, 2003

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Foam, alcohol-resistant foam, dry powder, carbon dioxide or water spray.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 85°C explosive vapour/air mixtures may be formed.</td>
<td>Above 85°C use a closed system, ventilation.</td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td><strong>INHALATION</strong></td>
<td>Local exhaust.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td></td>
<td><strong>SKIN</strong></td>
<td>Dry skin.</td>
<td>Protective gloves. Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td></td>
<td><strong>EYES</strong></td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td></td>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Give plenty of water to drink.</td>
</tr>
</tbody>
</table>

**Spillage Disposal:**

- Ventilation. Remove all ignition sources. Collect leaking liquid in sealable plastic containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. (Extra personal protection: filter respirator for organic gases and vapours.)

**Storage:**


**Packaging & Labelling:**

- UN Hazard Class: 6.1
- UN Packing Group: II

[http://www.cdc.gov/niosh/ipcsneng/neng0435.html](http://www.cdc.gov/niosh/ipcsneng/neng0435.html)
<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>COLOURLESS TO BROWN, OILY LIQUID</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>The substance can form explosive peroxides standing in contact with air. Reacts with halogens, strong acids and strong oxidants. The substance decomposes on burning producing toxic fumes.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV not established. MAK not established.</td>
</tr>
<tr>
<td>ROUTES OF EXPOSURE:</td>
<td>The substance can be absorbed into the body by inhalation and by ingestion.</td>
</tr>
<tr>
<td>INHALATION RISK:</td>
<td>No indication can be given about the rate at which a harmful concentration in the air is reached on evaporation of this substance at 20°C.</td>
</tr>
<tr>
<td>EFFECTS OF SHORT-TERM EXPOSURE:</td>
<td>See Notes.</td>
</tr>
<tr>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</td>
<td>The liquid defats the skin.</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**
- Boiling point: 187°C
- Melting point: -97 to -102°C
- Relative density (water = 1): 1.1
- Solubility in water, g/100 ml at 20°C: 0.2
- Vapour pressure, Pa at 20°C: 75
- Relative vapour density (air = 1): 6
- Flash point: 85°C o.c.
- Octanol/water partition coefficient as log Pow: 2.14 to 2.58

**ENVIRONMENTAL DATA**

**NOTES**
Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Environmental effects from the substance have not been investigated adequately.

Transport Emergency Card: TEC (R)-61GT1-II
NFPA Code: H3; F2; R0.
IMPORTANT LEGAL NOTICE:

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Diocetylphthalate
DOP; DEHP
Bis-(2-ethylhexyl)phthalate
\( \text{C}_{24}\text{H}_{38}\text{O}_{4} / \text{C}_{6}\text{H}_{4}\text{(COOC}_{8}\text{H}_{17})_{2} \)
Molecular mass: 390.6

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• INHALATION</td>
<td>Cough. Sore throat.</td>
<td>Ventilation, local exhaust, or breathing protection.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td>• SKIN</td>
<td>Protect.ive gloves.</td>
<td></td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>
| Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Chemical protection suit. | Separated from strong oxidants, acids, alkalis, and nitrates. Cool. Dry. Well closed. | T symbol
|                           |                          | R: 60-61
|                           |                          | S: 53-45

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL STATE; APPEARANCE:**
COLOURLESS TO LIGHT COLOURED VISCOUS LIQUID, WITH CHARACTERISTIC ODOR.

**CHEMICAL DANGERS:**
The substance decomposes on heating producing irritating fumes. Reacts with strong oxidants, acids, alkalis and nitrates.

**OCIMUM EXPOSURE LIMITS:**
TLV: 5 mg/m³; < A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).

**MAK:** 10 mg/m³;
Peak limitation category: II(8); Carcinogen category: 4;
Pregnancy risk group: C;
(DFG 2004).

**OSHA PEL:** TWA 5 mg/m³

**NIOSH REL:** Ca TWA 5 mg/m³ ST 10 mg/m³ See Appendix A

**NIOSH IDLH:** Ca 5000 mg/m³ See: 117817

**PHYSICAL PROPERTIES**
- Boiling point: 385°C
- Melting point: -50°C
- Relative density (water = 1): 0.986
- Solubility in water: none

**ENVIRONMENTAL DATA**
Bioaccumulation of this chemical may occur in seafood.

**NOTES**
Card has been partly updated in October 2005. See section Occupational Exposure Limits.

NFPA Code: H 0; F 1; R 0

**ADDITIONAL INFORMATION**

**ICSC: 0271**
(C) IPCS, CEC, 1994

**DI(2-ETHYLHEXYL) PHTHALATE**

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# International Chemical Safety Cards

## CHRYSENE

**Benzo[ghi]perylene**

**1,2-Benzophenanthrene**

**1,2,5,6-Dibenzonaphthalene**

\[ C_{18}H_{12} \]

Molecular mass: 228.3

**ICSC #**  1672  
**CAS #**  218-01-9  
**RTECS #** GC0700000  
**UN #**  3077  
**EC #**  601-048-00-0  
October 12, 2006 Validated

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
</table>

| EXPLOSION | Finely dispersed particles form explosive mixtures in air. | Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting. |

| EXPOSURE | See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. | AVOID ALL CONTACT! |

### INHALATION
- Local exhaust or breathing protection.  
- Fresh air, rest.

### SKIN
- Protective gloves. Protective clothing.  
- Remove contaminated clothes. Rinse and then wash skin with water and soap.

### EYES
- Safety goggles  
- First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

### INGESTION
- Do not eat, drink, or smoke during work.  
- Rinse mouth.

## SPILLAGE DISPOSAL

Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

## STORAGE

Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

## PACKAGING & LABELLING

- T symbol
- N symbol
- R: 45-68-50/53
- S: 53-45-60-61
- UN Hazard Class: 9
- UN Packing Group: III
- Signal: Warning
- Aqua-Cancer
- Suspected of causing cancer
- Very toxic to aquatic life with long lasting effects
- Very toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK
# International Chemical Safety Cards

## CHRYSENE

<table>
<thead>
<tr>
<th>I</th>
<th>M</th>
<th>P</th>
<th>O</th>
<th>R</th>
<th>T</th>
<th>A</th>
<th>T</th>
<th>D</th>
<th>A</th>
<th>T</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL STATE; APPEARANCE:</strong> COLOURLESS TO BEIGE CRYSTALS OR POWDER</td>
<td><strong>PHYSICAL DANGERS:</strong> Dust explosion possible if in powder or granular form, mixed with air.</td>
<td><strong>CHEMICAL DANGERS:</strong> The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants</td>
<td><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong> TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK not established.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Boiling point: 448°C</th>
<th>Solubility in water: very poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point: 254 - 256°C</td>
<td>Octanol/water partition coefficient as log Pow: 5.9</td>
</tr>
<tr>
<td>Density: 1.3 g/cm³</td>
<td></td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.

### NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>ICSC: 1672</th>
<th>CHRYSENE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
</tr>
</tbody>
</table>

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# DIBENZO(a,h)ANTHracene

ICSC: 0431

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Water spray, powder.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness.</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Rinse mouth.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.</td>
<td>Well closed.</td>
<td>T symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: 45-50/53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S: 53-45-60-61</td>
</tr>
</tbody>
</table>

---

**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALLINE POWDER.

**PHYSICAL DANGERS:**

**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration...
<table>
<thead>
<tr>
<th>CHEMICAL DANGERS:</th>
<th>of airborne particles can, however, be reached quickly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV not established.</td>
</tr>
<tr>
<td>PHYSICAL PROPERTIES</td>
<td>Boiling point: 524°C</td>
</tr>
<tr>
<td></td>
<td>Melting point: 267°C</td>
</tr>
<tr>
<td></td>
<td>Relative density (water = 1): 1.28</td>
</tr>
<tr>
<td>ENVIRONMENTAL DATA</td>
<td>Solubility in water: none</td>
</tr>
<tr>
<td></td>
<td>Octanol/water partition coefficient as log Pow: 6.5</td>
</tr>
<tr>
<td>Notes</td>
<td>Bioaccumulation of this chemical may occur in seafood.</td>
</tr>
<tr>
<td>Notes</td>
<td>This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**

**ICSC: 0431**

DIBENZO(a,h)ANTHRACENE

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Dibenzofuran
Product Number: 236373
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103 USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview
OSHA Hazards
Toxic by ingestion

HMIS Classification
Health hazard: 2
Flammability: 1
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 1
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
Eyes: May cause eye irritation.
Ingestion: Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Diphenylene oxide
Formula: C$_{12}$H$_8$O
Molecular Weight: 168.19 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>132-64-9</td>
<td>205-071-3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- **Form**: crystalline
- **Colour**: white, beige

**Safety data**
- **pH**: no data available
- **Melting point**: 80 - 82 °C (176 - 180 °F) - lit.
- **Boiling point**: 154 - 155 °C (309 - 311 °F) at 27 hPa (20 mmHg) - lit.
- **Flash point**: 130.0 °C (266.0 °F) - closed cup
- **Ignition temperature**: no data available
- **Lower explosion limit**: no data available
- **Upper explosion limit**: no data available
- **Water solubility**: no data available
- **Partition coefficient: n-octanol/water**: log Pow: 3.77

10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

**Acute toxicity**
no data available

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**
no data available

**Carcinogenicity**
- **IARC**: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- **ACGIH**: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- **NTP**: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- **OSHA**: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.

**Ingestion** Toxic if swallowed.

**Skin** May be harmful if absorbed through skin. May cause skin irritation.

**Eyes** May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: HP4430000

---

### 12. ECOLOGICAL INFORMATION

**Toxicity**

Toxicity to fish

- NOEC - Cyprinodon variegatus (sheepshead minnow) - 1 mg/l - 96.0 h
- LC50 - Pimephales promelas (fathead minnow) - 1.05 mg/l - 96.0 h

**Persistence and degradability**
no data available

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

---

### 13. DISPOSAL CONSIDERATIONS

**Product**
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

---

### 14. TRANSPORT INFORMATION

**DOT (US)**

- UN-Number: 3077  Class: 9  Packing group: III
- Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Dibenzofuran)
- Reportable Quantity (RQ): 100 lbs
- Marine pollutant: Marine pollutant
- Poison Inhalation Hazard: No

**IMDG**
UN-Number: 3077  Class: 9  Packing group: III  EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenzofuran)
Marine pollutant: Marine pollutant

IATA
UN-Number: 3077  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenzofuran)

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>132-64-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

Dibenzofuran

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>132-64-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

Dibenzofuran

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>132-64-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

Dibenzofuran

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>132-64-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

Dibenzofuran

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## DIETHYL PHTHALATE

1,2-Benzenedicarboxylic acid diethyl ester  
**DEP**  
\[ C_6H_4(COOC_2H_5)_2 / C_{12}H_{14}O_4 \]  
Molecular mass: 222.3

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0258</th>
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<tr>
<td>CAS #</td>
<td>84-66-2</td>
</tr>
<tr>
<td>RTECS #</td>
<td>T11050000</td>
</tr>
</tbody>
</table>

March 13, 2001 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Alcohol-resistant foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPOSURE

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INHALATION</strong></td>
<td>Dizziness. Dullness.</td>
<td>Ventilation. Local exhaust.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Protective gloves.</td>
<td></td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety spectacles.</td>
<td></td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. Nausea.</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Personal protection: particulate filter adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.

### STORAGE


### PACKAGING & LABELLING

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version.
International Chemical Safety Cards

DIETHYL PHTHALATE

**ICSC: 0258**

<table>
<thead>
<tr>
<th>I</th>
<th>PHYSICAL STATE; APPEARANCE: COLOURLESS OILY LIQUID</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>PHYSICAL DANGERS:</td>
</tr>
<tr>
<td>P</td>
<td>CHEMICAL DANGERS:</td>
</tr>
<tr>
<td>O</td>
<td>The substance decomposes on heating or on burning producing toxic fumes and gases (phthalic anhydride - see ICSC 0315). Attacks some plastics.</td>
</tr>
<tr>
<td>R</td>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
</tr>
<tr>
<td>T</td>
<td>TLV: 5 mg/m³ as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2005).</td>
</tr>
<tr>
<td>A</td>
<td>MAK not established.</td>
</tr>
<tr>
<td>N</td>
<td>OSHA PEL: none</td>
</tr>
<tr>
<td>T</td>
<td>NIOSH REL: TWA 5 mg/m³</td>
</tr>
<tr>
<td>D</td>
<td>NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></td>
</tr>
<tr>
<td>A</td>
<td>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</td>
</tr>
<tr>
<td>T</td>
<td>INHALATION RISK: A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C.</td>
</tr>
<tr>
<td>A</td>
<td>EFFECTS OF SHORT-TERM EXPOSURE:</td>
</tr>
<tr>
<td>T</td>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 295°C
- Melting point: -67 to -44°C
- Relative density (water = 1): 1.1
- Solubility in water, g/100 ml at 25°C: none
- Relative vapour density (air = 1): 7.7
- Flash point: 117°C (c.c.)
- Auto-ignition temperature: 457°C
- Explosive limits, vol% in air: 0.7%- ?
- Octanol/water partition coefficient as log Pow: 2.47

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to fish.

**NOTES**

Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

NFPA Code: H 0; F 1; R 0;
Card has been partially updated in July 2007: see Spillage Disposal.

**ADDITIONAL INFORMATION**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the

http://www.cdc.gov/niosh/ipcsneng/neng0258.html
IMPORTANT LEGAL NOTICE: collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

**DIMETHYL PHTHALATE**

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0261</th>
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<tbody>
<tr>
<td>CAS #</td>
<td>131-11-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>TI1575000</td>
</tr>
<tr>
<td>October 19, 2005 Validated</td>
<td></td>
</tr>
</tbody>
</table>

**Chemical Name:**
- Dimethyl 1,2-benzenedicarboxylate
- Phthalic acid dimethyl ester
- 1,2-Benzenedicarboxylic acid, dimethyl ester
- \( C_6H_4(COOCH_3)_2 \) / \( C_{10}H_{10}O_4 \)
  - Molecular mass: 194.2

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>• INHALATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>• SKIN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>• EYES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>• INGESTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**
- Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

**STORAGE**
- Store in an area without drain or sewer access.

**PACKAGING & LABELLING**

**SEE IMPORTANT INFORMATION ON BACK**

---

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# DIMETHYL PHTHALATE

**ICSC: 0261**

<table>
<thead>
<tr>
<th><strong>PHYSICAL STATE; APPEARANCE:</strong></th>
<th><strong>ROUTES OF EXPOSURE:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>OILY COLOURLESS LIQUID</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PHYSICAL DANGERS:</strong></th>
<th><strong>INHALATION RISK:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CHEMICAL DANGERS:</strong></th>
<th><strong>EFFECTS OF SHORT-TERM EXPOSURE:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance decomposes on burning producing irritating fumes.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></th>
<th><strong>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV: 5 mg/m³ as TWA; (ACGIH 2005).</td>
<td></td>
</tr>
<tr>
<td>MAK not established.</td>
<td></td>
</tr>
<tr>
<td>OSHA PEL: TWA 5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>NIOSH REL: TWA 5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>NIOSH IDLH: 2000 mg/m³ See: 131113</td>
<td></td>
</tr>
</tbody>
</table>

## PHYSICAL PROPERTIES

- Boiling point: 284°C
- Melting point: 5.5°C
- Relative density (water = 1): 1.19
- Solubility in water, g/100 ml at 20°C: 0.43
- Vapour pressure, Pa at 20°C: 0.8
- Relative vapour density (air = 1): 6.69
- Flash point: 146 °C c.c.
- Auto-ignition temperature: 490°C
- Explosive limits, vol% in air: 0.9 at 180°C - 8.0 at 109°C
- Octanol/water partition coefficient as log Pow: 1.47-2.12

## ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms.

## NOTES

Common name: DMP. Other melting points: the commercial product freezes around 0°C.

NFPA Code: H1; F1; R0

## ADDITIONAL INFORMATION

ICSC: 0261

(C) IPCS, CEC, 1994

## IMPORTANT LEGAL NOTICE:

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---

http://www.cdc.gov/niosh/ipcsneng/neng0261.html

12/9/2011
## DIBUTYL PHTHALATE

**ICSC: 0036**

| **ICSC #** | 0036 |
| **CAS #**  | 84-74-2 |
| **RTECS #** | T10875000 |
| **UN #**   | 3082 |
| **EC #**   | 607-318-00-4 |
| **July 03, 2002 Validated** |

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Foam, dry powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPLOSION

PREVENT GENERATION OF MISTS! AVOID ALL CONTACT!

### EXPOSURE

**• INHALATION**

Ventilation. Fresh air, rest.

**• SKIN**

Protective gloves. Remove contaminated clothes. Rinse skin with plenty of water or shower.

**• EYES**

Redness. Pain. Safety goggles. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**• INGESTION**


### SPILLAGE DISPOSAL

Collect leaking liquid in covered containers. Absorb remaining liquid in vermiculite, sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.

### STORAGE

Separated from strong oxidants. Store in an area without drain or sewer access.

### PACKAGING & LABELLING

- T symbol
- N symbol
- R: 61-62-50
- S: 53-45-61
- UN Hazard Class: 9
- UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

---

# International Chemical Safety Cards

## DIBUTYL PHTHALATE

| Physical State; Appearance: | Colourless to yellow viscous liquid, with characteristic odour. |
| PHYSICAL DANGERS: | As a result of flow, agitation, etc., electrostatic charges can be generated. |
| CHEMICAL DANGERS: | The substance decomposes on burning producing toxic and irritating fumes (phthalic anhydride, ICSC 0315). Reacts with strong oxidants. |
| Occupational Exposure Limits: | TLV: 5 mg/m³ as TWA (ACGIH 2001). MAK: 0.05 ppm 0.58 mg/m³. Peak limitation category: I(2); Carcinogen category: 4; Pregnancy risk group: C (DFG 2009). |
| OSHA PEL: | TWA 5 mg/m³ |
| NIOSH REL: | TWA 5 mg/m³ |
| NIOSH IDLH: | 4000 mg/m³ See: 84742 |
| Routes of Exposure: | The substance can be absorbed into the body by inhalation of its aerosol and by ingestion. |
| Inhalation Risk: | A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C. |
| Effects of Short-Term Exposure: | |
| Effects of Long-Term or Repeated Exposure: | Animal tests show that this substance possibly causes toxicity to human reproduction or development. |
| Physical Properties: | Boiling point: 340°C |
| Melting point: | -35°C |
| Relative density (water = 1): | 1.05 |
| Solubility in water, g/100 ml at 25°C: | 0.001 |
| Vapour pressure, kPa at 20°C: | < 0.01 |
| Relative vapour density (air = 1): | 9.58 |
| Relative density of the vapour/air-mixture at 20°C (air = 1): | 1.00 |
| Flash point: | 157°C c.c. |
| Auto-ignition temperature: | 402°C |
| Explosive limits, vol% in air: | 0.5 (at 235°C) to about 2.5 |
| Octanol/water partition coefficient as log Pow: | 4.72 |
| Environmental Data: | The substance is toxic to aquatic organisms. |
| Notes: | NFPA Code: H0; F1; R0. |
| Transport Emergency Card: | TEC (R)-90GM6-III |
| Card has been partially updated in April 2010: see Occupational Exposure Limits. |

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http://www.cdc.gov/niosh/ipcsneng/neng0036.html
<table>
<thead>
<tr>
<th>ICSC: 0036</th>
<th>DIBUTYL PHTHALATE</th>
</tr>
</thead>
</table>

**IMPORTANT LEGAL NOTICE:**
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Di-n-octyl phthalate
Product Number: 80153
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C24H38O4
Molecular Weight: 390.56 g/mol

<table>
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<tr>
<td>117-84-0</td>
<td>204-214-7</td>
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</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Reproductive hazard

Target Organs
Liver

HMIS Classification
Health Hazard: 1
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health Hazard: 1
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
4. FIRST AID MEASURES

**General advice**
Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration

**In case of skin contact**
Wash off with soap and plenty of water.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water.

5. FIRE-FIGHTING MEASURES

**Flammable properties**
- **Flash point**
  109.0 °C (228.2 °F) - closed cup
- **Ignition temperature**
  no data available

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Avoid breathing vapors, mist or gas.

**Environmental precautions**
Do not let product enter drains.

**Methods for cleaning up**
Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

**Handling**
Normal measures for preventive fire protection.

**Storage**
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Respiratory protection is not required. Where protection is desired, use multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
**Hand protection**
Handle with gloves.

**Eye protection**
Safety glasses

**Hygiene measures**
General industrial hygiene practice.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- Form: liquid, clear, viscous
- Colour: colourless

**Safety data**
- pH: no data available
- Melting point: no data available
- Boiling point: no data available
- Flash point: 109.0 °C (228.2 °F) - closed cup
- Ignition temperature: no data available
- Lower explosion limit: no data available
- Upper explosion limit: no data available
- Density: 0.98 g/mL at 20 °C (68 °F)
- Water solubility: no data available

### 10. STABILITY AND REACTIVITY

**Storage stability**
Stable under recommended storage conditions.

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

### 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**
- LD50 Oral - rat - 47,000 mg/kg
- LD50 Dermal - guinea pig - > 5,000 mg/kg

**Irritation and corrosion**
- Skin - rabbit - Mild skin irritation - 24 h
- Eyes - rabbit - Mild eye irritation - 24 h

**Sensitisation**
no data available

**Chronic exposure**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin May be harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Ingestion May be harmful if swallowed.

Target Organs Liver,

Additional Information
RTECS: TI1925000

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

Bioaccumulation Gambusia affinis (Mosquito fish) - 33 d
Bioconcentration factor (BCF): 9,400

Ecotoxicity effects
Toxicity to fish NOEC - Cyprinodon variegatus (sheepshead minnow) - 168 mg/l - 96 h

Further information on ecology
no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (Dioctyl phthalate)
Marine pollutant: No
Poison Inhalation Hazard: No
IMDG
Not dangerous goods
IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Reproductive hazard

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
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<td>Dioctyl phthalate</td>
<td>117-84-0</td>
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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

<table>
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<th>CAS-No.</th>
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<tbody>
<tr>
<td>Dioctyl phthalate</td>
<td>117-84-0</td>
<td>1989-12-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Fluoranthene
Product Number: 423947
Brand: Aldrich
Supplier: Sigma-Aldrich
Supplier Address: 3050 Spruce Street, SAINT LOUIS MO 63103, USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation, Product Safety - Americas Region, 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion. Carcinogen

GHS Classification
Acute toxicity, Oral (Category 4)
Acute toxicity, Dermal (Category 5)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning

Hazard statement(s)
H302 Harmful if swallowed.
H313 May be harmful in contact with skin.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 1
Chronic Health Hazard: *
Flammability: 1
Physical hazards: 0

NFPA Rating
Health hazard: 1
Fire: 1
Reactivity Hazard: 0
Potential Health Effects

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>May be harmful if inhaled. May cause respiratory tract irritation.</td>
</tr>
<tr>
<td>Skin</td>
<td>Harmful if absorbed through skin. May cause skin irritation.</td>
</tr>
<tr>
<td>Eyes</td>
<td>May cause eye irritation.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Harmful if swallowed.</td>
</tr>
</tbody>
</table>

3. COMPOSITION/INFORMATION ON INGREDIENTS

- **Synonyms**: Benzo[j,k]fluorene
- **Formula**: C_{16}H_{10}
- **Molecular Weight**: 202.25 g/mol

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<tr>
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<td>205-912-4</td>
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</tr>
</tbody>
</table>

4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self-contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Avoid breathing dust.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance
- **Form**: solid
- **Colour**: no data available

### Safety data
- **pH**: no data available
- **Melting point/freezing point**: Melting point/range: 105 - 110 °C (221 - 230 °F) - lit.
- **Boiling point**: 384 °C (723 °F) - lit.
- **Flash point**: 198.0 °C (388.4 °F) - closed cup
- **Ignition temperature**: no data available
- **Autoignition temperature**: no data available
- **Lower explosion limit**: no data available
- **Upper explosion limit**: no data available
- **Vapour pressure**: no data available
- **Density**: no data available
- **Water solubility**: no data available
- **Partition coefficient: n-octanol/water**: no data available
- **Relative vapour density**: no data available
- **Odour**: no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 2,000 mg/kg

Inhalation LC50
no data available

Dermal LD50
LD50 Dermal - rabbit - 3,180 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:  3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluoranthene)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: Reasonably anticipated to be human carcinogens. (Fluoranthene)

OSHA: Reasonably anticipated to be a human carcinogen (Fluoranthene)

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion: Harmful if swallowed.
Skin: Harmful if absorbed through skin. May cause skin irritation.
Eyes: May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: LL4025000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 0.0077 mg/l - 96 h
NOEC - Cyprinodon variegatus (sheepshead minnow) - 560 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates.
Immobilization EC50 - Daphnia magna (Water flea) - > 0.005 - < 0.01 mg/l - 3 d
Immobilization EC50 - Daphnia magna (Water flea) - 0.78 mg/l - 20 h
NOEC - Daphnia magna (Water flea) - 0.085 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.
13. DISPOSAL CONSIDERATIONS

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

14. TRANSPORT INFORMATION

**DOT (US)**
- UN number: 3077  Class: 9  Packing group: III
- Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Fluoranthene)
- Reportable Quantity (RQ): 100 lbs
- Marine pollutant: No
- Poison Inhalation Hazard: No

**IMDG**
Not dangerous goods

**IATA**
Not dangerous goods

15. REGULATORY INFORMATION

**OSHA Hazards**
Harmful by ingestion., Carcinogen

**SARA 302 Components**
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

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<td>2007-03-01</td>
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**SARA 311/312 Hazards**
Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

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**Pennsylvania Right To Know Components**

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**New Jersey Right To Know Components**

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</table>

**California Prop. 65 Components**
WARNING! This product contains a chemical known to the State of California to cause cancer.

<table>
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</thead>
<tbody>
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<td>1990-01-01</td>
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16. OTHER INFORMATION

**Further information**
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Fluorene
Product Number: 46880
Brand: Aldrich
Product Use: For laboratory research purposes.
Supplier: Sigma-Aldrich
Manufacturer: Sigma-Aldrich Corporation
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

GHS Classification
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word
Warning

Hazard statement(s)
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 1
Flammability: 1
Physical hazards: 0

NFPA Rating
Health hazard: 1
Fire: 1
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
Eyes
Ingestion
May cause eye irritation.
May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
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<th>Formula</th>
<th>C&lt;sub&gt;13&lt;/sub&gt;H&lt;sub&gt;10&lt;/sub&gt;</th>
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<tr>
<td>Molecular Weight</td>
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<td>Fluorene</td>
<td>86-73-7</td>
<td>201-695-5</td>
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4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form crystalline
Colour white

Safety data
pH no data available
Melting/freezing point
Melting point/range: 113 - 115 °C (235 - 239 °F)
Melting point/range: 111 - 114 °C (232 - 237 °F) - lit.
Boiling point 298 °C (568 °F) - lit.
Flash point 151.0 °C (303.8 °F) - closed cup
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density no data available
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
Odour no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
LD50 Intraperitoneal - mouse - > 2.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluorene)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Teratogenicity

no data available
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

- Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
- Ingestion: May be harmful if swallowed.
- Skin: May be harmful if absorbed through skin. May cause skin irritation.
- Eyes: May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: LL5670000

12. ECOLOGICAL INFORMATION

Toxicity

- Toxicity to fish: LC50 - Fish - 0.82 mg/l - 96 h
- Toxicity to daphnia and other aquatic invertebrates: Remarks: no data available

Ecotoxicology

- Toxicity to algae: EC50 - Algae - 3.4 mg/l - 96 h

Persistence and degradability

Bioaccumulative potential

- Bioaccumulation: Oncorhynchus mykiss (rainbow trout) - 24 h
- Bioconcentration factor (BCF): 512

Mobility in soil
Adsorbs on soil.

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.
no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods
IMDG  
UN-Number: 3077  Class: 9  Packing group: III  EMS-No: F-A, S-F  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Fluorene)  
Marine pollutant: Marine pollutant

IATA  
UN-Number: 3077  Class: 9  Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluorene)

Further information  
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards  
No known OSHA hazards

DSL Status  
All components of this product are on the Canadian DSL list.

SARA 302 Components  
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components  
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards  
No SARA Hazards

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>86-73-7</td>
<td>2007-03-01</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>86-73-7</td>
<td>2007-03-01</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>86-73-7</td>
<td>2007-03-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information

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HEXACHLOROBENZENE

Perchlorobenzene
HCB
Pentachlorophenylchloride
Phenyl perchloryl
C₆Cl₆
Molecular mass: 284.8

ICSC # 0895
CAS # 118-74-1
RTECS # DA2975000
UN # 2729
EC # 602-065-00-6
March 24, 1999 Validated

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Water spray, foam, powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• INHALATION</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED!</td>
<td>Protective gloves. Protective clothing.</td>
<td>Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles. Chemical protection.</td>
<td>Separated from food and feedstuffs. Well closed.</td>
<td>Do not transport with food and feedstuffs. Note: E T symbol N symbol R: 45-48/25-50/53</td>
</tr>
</tbody>
</table>
HEXACHLOROBENZENE

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO WHITE SOLID IN VARIOUS FORMS.

CHEMICAL DANGERS:
The substance decomposes on heating producing toxic fumes.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.002 mg/m³ as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: skin absorption (H); Carcinogen category: 4; Pregnancy risk group: D; (DFG 2004).

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may have effects on the liver and nervous system, resulting in impaired functions of organs and skin lesions. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may occur specifically in plants and in fish. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

NOTES
Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Amatin, Anticarie, Bunt-cure, No Bunt 80, Bunt-no-more (Dow chemicals), Co-op-hexa (Bayer chemicals), Sanocide, Sniciotox are trade names. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.
**ICSC: 0895**  
**HEXACHLOROBENZENE**

(C) IPCS, CEC, 1994

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## International Chemical Safety Cards

### HEXACHLOROBUTADIENE

ICSC: 0896

1,1,2,3,4,4-Hexachloro-1,3-butadiene  
Perchlorobutadiene  
$C_4Cl_6 / CCl_2=CCICl=CCl_2$  
Molecular mass: 260.8

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0896</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>87-68-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>EJ0700000</td>
</tr>
<tr>
<td>UN #</td>
<td>2279</td>
</tr>
<tr>
<td>August 10, 1997 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLOSION</th>
<th>EXPOSURE</th>
<th>AVOID ALL CONTACT!</th>
</tr>
</thead>
</table>

### EXPOSURE

**• INHALATION**  
Burning sensation. Cough. Sore throat. Symptoms may be delayed (see Notes). Coma.  
Ventilation, local exhaust, or breathing protection.  
Fresh air, rest. Refer for medical attention.  

**• SKIN**  
Protective gloves. Protective clothing.  
Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.  

**• EYES**  
Face shield, or eye protection in combination with breathing protection.  
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.  

**• INGESTION**  
Burning sensation. Abdominal pain. Shock or collapse.  
Do not eat, drink, or smoke during work.  
Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer for medical attention.  

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal

### STORAGE

Separated from food and feedstuffs. Well closed. Ventilation along the floor. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Severe marine pollutant.  
UN Hazard Class: 6.1  
UN Packing Group: III
**International Chemical Safety Cards**

**HEXACHLOROBUTADIENE**

**ICSC: 0896**

| I | PHYSICAL STATE: APPEARANCE: COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR. |
| M | ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion. |
| P | INHALATION RISK: A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C. |
| O | EFFECTS OF SHORT-TERM EXPOSURE: The vapour irritates the eyes, the skin and the respiratory tract. The liquid is corrosive. The substance may cause effects on the kidneys. |
| R | EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact may cause skin sensitization. May cause genetic damage in humans. |
| T | OCCUPATIONAL EXPOSURE LIMITS: TLV (as TWA): 0.02 ppm; 0.21 mg/m³ A3 (skin) (ACGIH 1997). |
| A | MAK: skin absorption (H); Carcinogen category: 3B (DFG 2008). |
| N | OSHA PEL†: none |
| T | NIOSH REL: Ca TWA 0.02 ppm (0.24 mg/m³) skin See Appendix A |
| D | NIOSH IDLH: Ca N.D. See: IDLH INDEX |
| A | PHYSICAL PROPERTIES: Boiling point: 212°C Melting point: -18°C Relative density (water = 1): 1.68 Solubility in water: none Vapour pressure, Pa at 20°C: 20 |
| T | Relative vapour density (air = 1): 9.0 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00 Flash point: 90°C Auto-ignition temperature: 610°C Octanol/water partition coefficient as log Pow: 4.90 |
| A | ENVIRONMENTAL DATA: The substance is toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish. The substance may cause long-term effects in the aquatic environment. |

**NOTES**

- Transport Emergency Card: TEC (R)-613
- NFPA Code: H2; F1; R1;
- Card has been partially updated in November 2008: see Occupational Exposure Limits,
### IMPORTANT LEGAL NOTICE:

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# International Chemical Safety Cards

## HEXACHLOROCYCLOPENTADIENE

ICSC: 1096

---

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>TYPES OF EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td></td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain. Blurred vision. Severe deep burns.</td>
<td>Face shield or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. Burning sensation. Shock or collapse. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### Spillage Disposal

Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this

### Storage

Store in an area without drain or sewer access. Dry. Well closed. Ventilation along the floor.

### Packaging & Labelling

T+ symbol
N symbol
**CHEMICAL:** Enter the environment. Collect leaking liquid in sealable plastic containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place.

R: 22-24-26-34-50/53  
S: 1/2-25-45-53-60-61  
UN Hazard Class: 6.1  
UN Packing Group: I

<table>
<thead>
<tr>
<th>PHYSICAL STATE: APPEARANCE:</th>
<th>ROUTES OF EXPOSURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OILY YELLOW TO GREEN LIQUID, WITH PUNGENT ODOUR.</td>
<td>The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL DANGERS:</th>
<th>INHALATION RISK:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vapour is heavier than air.</td>
<td>A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEMICAL DANGERS:</th>
<th>EFFECTS OF SHORT-TERM EXPOSURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride and phosgene. Reacts with moist air to produce hydrogen chloride (see ICSC0163). Attacks many metals forming flammable/explosive gas (hydrogen - see ICSC0001) in the presence of water.</td>
<td>The substance is corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. Inhalation of the substance may cause lung oedema (see Notes). The substance may cause effects on the kidneys and liver, resulting in tissue lesions. The effects may be delayed. Medical observation is indicated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OCCUPATIONAL EXPOSURE LIMITS:</th>
<th>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV: 0.01 ppm as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2005).</td>
<td></td>
</tr>
<tr>
<td>MAK: IIb (not established but data is available); skin absorption (H); (DFG 2005).</td>
<td></td>
</tr>
<tr>
<td>OSHA PEL†: none</td>
<td></td>
</tr>
<tr>
<td>NIOSH REL: TWA 0.01 ppm (0.1 mg/m³)</td>
<td></td>
</tr>
<tr>
<td>NIOSH IDLH: N.D. See: IDLH INDEX</td>
<td></td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 239°C
- Melting point: -9°C
- Relative density (water = 1): 1.7
- Solubility in water, g/100 ml at 25°C: 0.2
- Vapour pressure, Pa at 20°C: 10.7
- Relative vapour density (air = 1): 9.4
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00
- Octanol/water partition coefficient as log Pow: 4-5

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. The substance may cause long-term effects in the aquatic environment.

**NOTES**

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered.

Transport Emergency Card: TEC (R)-61S2646 or 61GT1-I

[See Important Information on Back]
IMPORTANT LEGAL NOTICE:

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# International Chemical Safety Cards

## ISOPHORONE

1,1,3-Trimethyl-3-cyclohexene-5-one  
3,5,5-Trimethylcyclohex-2-enone  
Isoacetophorone  
C₉H₁₄O  
Molecular mass: 138.2

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0169</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>78-59-1</td>
</tr>
<tr>
<td>RTECS #</td>
<td>GW7700000</td>
</tr>
<tr>
<td>EC #</td>
<td>606-012-00-8</td>
</tr>
<tr>
<td>October 04, 2000 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
<td></td>
</tr>
</tbody>
</table>

| EXPLOSION | Above 84°C explosive vapour/air mixtures may be formed. | Above 84°C use a closed system, ventilation. | |

| EXPOSURE | PREVENT GENERATION OF MISTS! |

### ACUTE HAZARDS/SYMPTOMS

- **INHALATION**  
  Ventilation, local exhaust, or breathing protection.  
  Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

- **SKIN**  
  Protective gloves.  
  Remove contaminated clothes. Rinse and then wash skin with water and soap.

- **EYES**  
  Safety spectacles.  
  First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**  
  Abdominal pain. (Further see Inhalation).  
  Do not eat, drink, or smoke during work.  
  Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting.

### SPILLAGE DISPOSAL

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours.

### STORAGE

Separated from strong oxidants, strong bases, amines.

### PACKAGING & LABELLING

Xn symbol  
R: 21/22-36/37-40  
S: 2-13-23-36/37/39-46

---

http://www.cdc.gov/niosh/ipcsneng/neng0169.html  
12/9/2011
# International Chemical Safety Cards

## ISOPHORONE

<table>
<thead>
<tr>
<th>ICSC: 0169</th>
</tr>
</thead>
</table>

### PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:

### CHEMICAL DANGERS:
Reacts with strong oxidants, strong bases and amines.

### OCCUPATIONAL EXPOSURE LIMITS:

- **TLV:** 5 ppm; (Ceiling value); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
- **MAK:** 2 ppm, 11 mg/m³; Peak limitation category: I(2); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).
- **OSHA PEL:** TWA 25 ppm (140 mg/m³)
- **NIOSH REL:** TWA 4 ppm (23 mg/m³)
- **NIOSH IDLH:** 200 ppm See: [78591](#).

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

### INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance and the vapour of this substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

### PHYSICAL PROPERTIES:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>215°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>-8°C</td>
</tr>
<tr>
<td>Relative density (water = 1)</td>
<td>0.92</td>
</tr>
<tr>
<td>Solubility in water, g/100 ml at 25°C</td>
<td>1.2</td>
</tr>
<tr>
<td>Vapour pressure, Pa at 20°C</td>
<td>40</td>
</tr>
<tr>
<td>Relative vapour density (air = 1)</td>
<td>4.8</td>
</tr>
<tr>
<td>Flash point</td>
<td>84°C c.c.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>460°C</td>
</tr>
<tr>
<td>Explosive limits, vol% in air</td>
<td>0.8-3.8</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow</td>
<td>1.67</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA

The occupational exposure limit value should not be exceeded during any part of the working exposure. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

### ADDITIONAL INFORMATION

NFPA Code: H 2; F 2; R 0;

**ICSC: 0169**

(C) IPCS, CEC, 1994
IMPORTANT LEGAL NOTICE:

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# International Chemical Safety Cards

## HEXACHLOROETHANE

ICSC: 0051

Perchloroethane  
Carbon hexachloride  
C₂Cl₆ / Cl₃CCl₃  
Molecular mass: 236.7

**ICSC #** 0051  
**CAS #** 67-72-1  
**RTECS #** KI4025000  
April 28, 1993 Validated

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td><strong>PREVENT DISPERSION OF DUST! PREVENT GENERATION OF MISTS!</strong></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td><img src="https://example.com" alt="Image" /> Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>MAY BE ABSORBED!</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety goggles .</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

### Spillage Disposal

Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.

### Storage

Separated from metals, food and feedstuffs. See Chemical Dangers.

### Packaging & Labelling

See important information on back.

Prepared in the context of cooperation between the International Programme on Chemical Safety & the

http://www.cdc.gov/niosh/ipcsneng/neng0051.html  
12/9/2011
HEXACHLOROETHANE

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS CRYSTALS, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on heating above 300°C producing toxic and corrosive fumes, phosgene (see ICSC 0007) and hydrogen chloride (see ICSC 0163). Reacts violently with zinc, aluminium powder and sodium. Attacks iron in the presence of moisture.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 1 ppm (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: 1 ppm, 9.8 mg/m³; Peak limitation category: II(2); (DFG 2004).
OSHA PEL: TWA 1 ppm (10 mg/m³) skin
NIOSH REL: Ca TWA 1 ppm (10 mg/m³) skin
See Appendix A See Appendix C (Chloroethanes)
NIOSH IDLH: Ca 300 ppm See: 67721

**PHYSICAL PROPERTIES**
Sublimation point: 183-185°C
Relative density (water = 1): 2.1
Solubility in water: none
Vapour pressure, Pa at 20°C: 53
Relative vapour density (air = 1): 8.2
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0
Octanol/water partition coefficient as log Pow: 3.9

**ENVIRONMENTAL DATA**
This substance may be hazardous in the environment; special attention should be given to fish.

**NOTES**
Use of alcoholic beverages enhances the harmful effect. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See section Occupational Exposure Limits.
**IMPORTANT LEGAL NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

## INDENO(1,2,3-cd)PYRENE

**ICSC: 0730**

<table>
<thead>
<tr>
<th>Physical State: Appearance:</th>
<th>Physical Dangers:</th>
<th>Routes of Exposure:</th>
<th>Inhalation Risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td><strong>M</strong></td>
<td><strong>P</strong></td>
<td>The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</td>
</tr>
</tbody>
</table>

## PHYSICAL STATE / APPEARANCE:

**I**

**M**

**P**

**YELLOW CRYSTALS**

## PHYSICAL DANGERS:

<table>
<thead>
<tr>
<th>Types of Hazard / Exposure</th>
<th>Acute Hazards / Symptoms</th>
<th>Prevention</th>
<th>First Aid / Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td></td>
<td></td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety spectacles or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

## STORAGE

Provision to contain effluent from fire extinguishing. Well closed.

## PACKAGING & LABELLING

R:  
S:  

---

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.
MAK:
Carcinogen category: 2;
(DFG 2004).

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
This substance is possibly carcinogenic to humans.

| PHYSICAL PROPERTIES | Boiling point: 536°C  
| Melting point: 164°C  
| Solubility in water: none  
| Octanol/water partition coefficient as log Pow: 6.58 |

**ENVIRONMENTAL DATA**
This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.

**NOTES**
Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0730**

(C) IPCS, CEC, 1994

**INDENO(1,2,3-cd)PYRENE**

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**NAPHTHALENE**

Naphthene
\[ C_{10}H_8 \]
Molecular mass: 128.18

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0667</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>91-20-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>QJ0525000</td>
</tr>
<tr>
<td>UN #</td>
<td>1334 (solid); 2304 (molten)</td>
</tr>
<tr>
<td>EC #</td>
<td>601-052-00-2</td>
</tr>
<tr>
<td>April 21, 2005 Peer reviewed</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD / EXPOSURE

#### FIRE
- Combustible.
- No open flames.
- Powder, water spray, foam, carbon dioxide.

#### EXPLOSION
- Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.
- Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.

### EXPOSURE

#### INHALATION
- Ventilation (not if powder), local exhaust, or breathing protection.
- Fresh air, rest. Refer for medical attention.

#### SKIN
- MAY BE ABSORBED! (Further see Inhalation).
- Protective gloves.
- Rinse skin with plenty of water or shower.

#### EYES
- Safety spectacles.
- First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

#### INGESTION
- Do not eat, drink, or smoke during work. Wash hands before eating.
- Rest. Refer for medical attention.

### SPILLAGE DISPOSAL

Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

### STORAGE

Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access.

### PACKAGING & LABELLING


SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

## NAPHTHALENE

### PHYSICAL STATE; APPEARANCE:
White solid in various forms, with characteristic odour.

### PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

### CHEMICAL DANGERS:
On combustion, forms irritating and toxic gases. Reacts with strong oxidants.

### OCCUPATIONAL EXPOSURE LIMITS:
- TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005).
- MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
- OSHA PEL: TWA 10 ppm (50 mg/m³)
- NIOSH REL: TWA 10 ppm (50 mg/m³) ST 15 ppm (75 mg/m³)
- NIOSH IDLH: 250 ppm See: 91203

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

### INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the blood, resulting in lesions of blood cells (haemolysis) See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood, resulting in chronic haemolytic anaemia. The substance may have effects on the eyes, resulting in the development of cataract. This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES
- Boiling point: 218°C
- Sublimation slowly at room temperature
- Melting point: 80°C
- Density: 1.16 g/cm³
- Solubility in water, g/100 ml at 25°C: none
- Vapour pressure, Pa at 25°C: 11
- Relative vapour density (air = 1): 4.42
- Flash point: 80°C c.c.
- Auto-ignition temperature: 540°C
- Explosive limits, vol% in air: 0.9-5.9
- Octanol/water partition coefficient as log Pow: 3.3
- Environmental Data:

  The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

### NOTES

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)

NFPA Code: H2; F2; R0;

### ADDITIONAL INFORMATION

ICSC: 0667

(C) IPCS, CEC, 1994

### IMPORTANT LEGAL NOTICE:

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# International Chemical Safety Cards

## NITROBENZENE

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0065</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>98-95-3</td>
</tr>
<tr>
<td>RTECS #</td>
<td>DA6475000</td>
</tr>
<tr>
<td>UN #</td>
<td>1662</td>
</tr>
<tr>
<td>EC #</td>
<td>609-003-00-7</td>
</tr>
<tr>
<td>Validated Date</td>
<td>April 06, 2006</td>
</tr>
</tbody>
</table>

### C₆H₅NO₂
Molecular mass: 123.1

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Water spray. Alcohol-resistant foam. Dry powder. Carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 88°C explosive vapour/air mixtures may be formed. Risk of fire and explosion (see Chemical Dangers).</td>
<td>Above 88°C use a closed system, ventilation.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Safety goggles.</td>
<td></td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>(see Inhalation).</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL
Personal protection: complete protective clothing including self-contained breathing apparatus. Collect

### STORAGE
Separated from combustible and reducing substances, strong oxidants, strong acids, food and feedstuffs. Store

### PACKAGING & LABELLING
Do not transport with food and feedstuffs. T symbol

[http://www.cdc.gov/niosh/ipcsneng/neng0065.html](http://www.cdc.gov/niosh/ipcsneng/neng0065.html)
leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.

in an area without drain or sewer access.

N symbol
S: 1/2-28-36/37-45-61
UN Hazard Class: 6.1
UN Packing Group: II
Signal: Danger
Skull-Health haz
Harmful if swallowed
Toxic if inhaled vapour
Toxic in contact with skin
Suspected of causing cancer
Suspected of damaging fertility or the unborn child
May cause damage to blood cells
Harmful to aquatic life with long lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0065

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

NITROBENZENE

ICSC: 0065

PHYSICAL STATE; APPEARANCE:
PALE YELLOW OILY LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
On combustion, forms toxic and corrosive fumes including nitrogen oxides. Reacts violently with strong oxidants and reducing agents causing fire and explosion hazard.
Reacts violently with strong acids and nitrogen oxides causing explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 1 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2005).
MAK: skin absorption (H); Carcinogen category: 3B; BAT issued; (DFG 2006).
EU OEL: 1 mg/m³, 0.2 ppm as TWA (skin) (EU 2006).
OSHA PEL: TWA 1 ppm (5 mg/m³) skin
NIOSH REL: TWA 1 ppm (5 mg/m³) skin
NIOSH IDLH: 200 ppm See: 98953

Boiling point: 211°C Relative density of the vapour/air-mixture at

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation through the skin and by ingestion

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the blood, resulting in the formation of methaemoglobin. Exposure could cause lowering of consciousness. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood, spleen and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

SEE IMPORTANT INFORMATION ON BACK

ICSC: NENG0065 International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH  Page 2 of 3

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
<th>Melting point: 5°C</th>
<th>20°C (air = 1): 1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relative density (water = 1): 1.2</td>
<td>Flash point: 88°C c.c.</td>
</tr>
<tr>
<td></td>
<td>Solubility in water, g/100 ml: 0.2</td>
<td>Auto-ignition temperature: 480°C</td>
</tr>
<tr>
<td></td>
<td>Vapour pressure, Pa at 20°C: 20</td>
<td>Explosive limits, vol% in air: 1.8-40</td>
</tr>
<tr>
<td></td>
<td>Relative vapour density (air = 1): 4.2</td>
<td>Octanol/water partition coefficient as log Pow:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.86</td>
</tr>
</tbody>
</table>

| ENVIRONMENTAL DATA        | The substance is harmful to aquatic organisms. It is strongly advised that this substance does not enter the environment. |

**NOTES**

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Do NOT take working clothes home. Card has been partly updated in October 2006: see sections Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1662 or 61GT1-II
NFPA Code: H 3; F 2; R 1;
Card has been partially updated in January 2008: see GHS classification.

**ADDITIONAL INFORMATION**

**ICSC: 0065**

(C) IPCS, CEC, 1994

**NITROBENZENE**

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

## N-NITROSODIMETHYLAMINE

**ICSC:** 0525

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0525</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>62-75-9</td>
</tr>
<tr>
<td>RTECS #</td>
<td>IQ0525000</td>
</tr>
<tr>
<td>UN #</td>
<td>2810</td>
</tr>
<tr>
<td>EC #</td>
<td>612-077-00-3</td>
</tr>
</tbody>
</table>

March 13, 2001 Validated

---

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Powder, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>AVOID ALL CONTACT!</td>
<td></td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Pain. Redness.</td>
<td>Face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal cramps. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Give a slurry of activated charcoal in water to drink. Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Evacuate danger area! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Chemical protection suit including self-contained breathing apparatus.

### STORAGE


### PACKAGING & LABELLING

Do not transport with food and feedstuffs. Unbreakable packaging; put breakable packaging into closed unbreakable container.

Note: E T+ symbol N symbol

---

[http://www.cdc.gov/niosh/ipcsneng/neng0525.html](http://www.cdc.gov/niosh/ipcsneng/neng0525.html)
N-NITROSODIMETHYLAMINE

PHYSICAL STATE: APPEARANCE:
YELLOW OILY LIQUID

PHYSICAL DANGERS:
The substance decomposes on heating producing nitrogen oxides. Reacts with strong oxidants and strong bases.

CHEMICAL DANGERS:
The substance decomposes on heating producing nitrogen oxides. Reacts with strong oxidants and strong bases.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2000).
MAK: skin absorption (H);
Carcinogen category: 2 (DFG 2006).
OSHA PEL: 1910.1016 See Appendix B
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca N.D. See: IDLH INDEX

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the liver, resulting in jaundice. The effects may be delayed. See Notes. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, resulting in liver function impairment and cirrhosis. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES
Boiling point: 151°C
Relative density (water = 1): 1.0
Solubility in water: very good

Vapour pressure, Pa at 20°C: 360
Relative vapour density (air = 1): 2.56
Flash point: 61°C
Octanol/water partition coefficient as log Pow: -0.57

ENVIRONMENTAL DATA

NOTES
The symptoms of jaundice do not become manifest until some hours have passed. Environmental effects from the substance have not been investigated adequately.

Transport Emergency Card: TEC (R)-61G61b
Card has been partially updated in August 2007: see Ingestion First Aid, Occupational Exposure Limits.
IMPORTANT LEGAL NOTICE:
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: N-Nitrosodi-n-propylamine

Product Number: 48554
Brand: Supelco
Supplier: Sigma-Aldrich

Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

Preparation Information:
Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion, Carcinogen

Target Organs
Liver, Kidney, Throat, Lungs

GHS Classification
Acute toxicity, Oral (Category 4)
Carcinogenicity (Category 1B)
Acute aquatic toxicity (Category 2)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H302 Harmful if swallowed.
H350 May cause cancer.
H401 Toxic to aquatic life.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P201 Obtain special instructions before use.
P308 + P313 IF exposed or concerned: Get medical advice/attention.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0
NFPA Rating
- Health hazard: 2
- Fire: 0
- Reactivity Hazard: 0

Potential Health Effects
- **Inhalation:** May be harmful if inhaled. May cause respiratory tract irritation.
- **Skin:** May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes:** May cause eye irritation.
- **Ingestion:** Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Nitroso dipropylamine</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>621-64-7</td>
</tr>
<tr>
<td>EC-No.</td>
<td>210-698-0</td>
</tr>
<tr>
<td>Index-No.</td>
<td>612-098-00-8</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

**Conditions of flammability**
Not flammable or combustible.

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.
7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour no data available

Safety data
pH no data available
Melting point/freezing point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density 0.92 g/cm3
Water solubility no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
copper salts, mercury salts, Strong mineral acids, Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 480.0 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (N-Nitroso dipropylamine)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: Reasonably anticipated to be a human carcinogen (N-Nitroso dipropylamine)
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

- **Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion** Toxic if swallowed.
- **Skin** May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes** May cause eye irritation.

**Signs and Symptoms of Exposure**

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**

no data available

**Additional Information**

RTECS: JL9700000

12. ECOLOGICAL INFORMATION

**Toxicity**

no data available

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.
14. TRANSPORT INFORMATION

DOT (US)
UN number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (N-Nitroso dipropylamine)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3082  Class: 9  Packing group: III  EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (N-Nitroso dipropylamine)
Marine pollutant: No

IATA
UN number: 3082  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (N-Nitroso dipropylamine)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion, Carcinogen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Nitroso dipropylamine</td>
<td>621-64-7</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
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<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Nitroso dipropylamine</td>
<td>621-64-7</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
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<tr>
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<tr>
<td>N-Nitroso dipropylamine</td>
<td>621-64-7</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Nitroso dipropylamine</td>
<td>621-64-7</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Nitroso dipropylamine</td>
<td>621-64-7</td>
<td>2007-09-28</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
### N-NITROSODIPHENYLAMINE

**ICSC:** 0526

**Diphenylnitrosamine**

-N-Nitroso-N-phenyl benzenamine
-N-nitroso-N-phenylaniline
-Nitrous diphenylamide

C₁₂H₁₀N₂O

Molecular mass: 198.2

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Foam, powder, carbon dioxide</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>•INHALATION</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
<td></td>
</tr>
<tr>
<td>•SKIN</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
<td></td>
</tr>
<tr>
<td>•EYES</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td>•INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Do NOT let this chemical enter the environment.

### STORAGE

Separated from strong oxidants. Store in an area without drain or sewer access.

### PACKAGING & LABELLING

SEE IMPORTANT INFORMATION ON BACK

### PREPARED IN THE CONTEXT OF COOPERATION BETWEEN THE INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY & THE COMMISSION OF THE EUROPEAN COMMUNITIES (C) IPCS CEC 1994. NO MODIFICATIONS TO THE INTERNATIONAL VERSION HAVE BEEN MADE EXCEPT TO ADD THE OSHA PELs, NIOSH RELs AND NIOSH IDLH VALUES.

---

**ICSC: 0526**

http://www.cdc.gov/niosh/ipcsneng/neng0526.html
### N-NITROSODIPHENYLAMINE

**ICSC: 0526**

<table>
<thead>
<tr>
<th></th>
<th><strong>PHYSICAL STATE; APPEARANCE:</strong></th>
<th><strong>ROUTES OF EXPOSURE:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YELLOW FLAKES</td>
<td>The substance can be absorbed into the body by ingestion.</td>
</tr>
</tbody>
</table>

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**

The substance decomposes on burning producing nitrogen oxides. Reacts vigorously with oxidants.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

**MAK:**

Carcinogen category: 3B (DFG 2006).

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Boiling point: 101°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point: 66.5°C</td>
</tr>
<tr>
<td>Density: 1.23 g/cm³</td>
</tr>
</tbody>
</table>

**Solubility in water:**

| none |

**Octanol/water partition coefficient as log Pow:**

| 2.57-3.13 |

**ENVIRONMENTAL DATA**

The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. It is strongly advised that this substance does not enter the environment.

**NOTES**

Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

Card has been partially updated in August 2007: see Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

<table>
<thead>
<tr>
<th>ICSC: 0526</th>
<th><strong>N-NITROSODIPHENYLAMINE</strong></th>
</tr>
</thead>
</table>

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# PENTACHLOROPHENOL

**ICSC:** 0069  
**C₆Cl₅OH**  
Molecular mass: 266.4

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Liquid formulations containing organic solvents may be flammable.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough. Dizziness. Drowsiness. Headache. Fever or elevated body temperature. Laboured breathing. Sore throat.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>MAY BE ABSORBED! Redness. Blisters. (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles, face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>

http://www.cdc.gov/niosh/ipcsneng/neng0069.html
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Complete protective clothing. (Extra personal protection: P3 filter respirator for toxic particles.)

Provision to contain effluent from fire extinguishing. Separated from strong oxidants, food and feedstuffs. Keep in a well-ventilated room.

Do not transport with food and feedstuffs.

Severe marine pollutant.

T+ symbol
N symbol
R: 24/26-36/37/38-40-50/53
S: 1/2-22-36/37-45-52-60-61
UN Hazard Class: 6.1
UN Packing Group: II

See Important Information on back

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

### International Chemical Safety Cards

#### PENTACHLOROPHENOL

<table>
<thead>
<tr>
<th>P</th>
<th>I</th>
<th>M</th>
<th>N</th>
<th>T</th>
<th>D</th>
<th>A</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL STATE; APPEARANCE: WHITE CRYSTALS OR SOLID IN VARIOUS FORMS, WITH CHARACTERISTIC ODOUR.</td>
<td>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS: The substance decomposes on heating above 200°C, producing toxic and corrosive fumes including dioxins. Reacts violently with strong oxidants.</td>
<td>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the cardiovascular system, resulting in cardiac disorders and heart failure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.5 mg/m³ as TWA; (skin); A3; BEI issued; (ACGIH 2003). MAK: H; Carcinogen category: 2; (DFG 2002). OSHA PEL: TWA 0.5 mg/m³ skin NIOSH REL: TWA 0.5 mg/m³ skin NIOSH IDLH: 2.5 mg/m³ See: 87865</td>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the central nervous system, kidneys, liver, lungs, immune system, thyroid. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiling point (decomposes): 309°C Melting point: 191°C Density: 1.98 Solubility in water, g/100 ml at 20°C: 0.001</td>
<td>Vapour pressure, Pa at 20°C: 0.02 Relative vapour density (air = 1): 9.2 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00 Octanol/water partition coefficient as log Pow: 5.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL DATA The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NOTES
The commercial product may contain very toxic impurities (dioxins). The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-61GT2-II
NFPA Code: H 3; F 0; R 0;

ADDITIONAL INFORMATION

ICSC: 0069 PENTACHLOROPHENOL
(C) IPCS, CEC, 1994

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Phenanthrene
Product Number: 695114
Brand: Aldrich
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103 USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion., Irritant

Other hazards which do not result in classification
Photosensitizer.

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning

Hazard statement(s)
H302   Harmful if swallowed.
H315   Causes skin irritation.
H319   Causes serious eye irritation.
H335   May cause respiratory irritation.
H400   Very toxic to aquatic life.
H413   May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P261    Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273    Avoid release to the environment.
P305 + P 351 + P 338  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard: 2
Flammability: 0
Physical hazards: 0

NFPA Rating

Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes
Causes eye irritation.
Ingestion
Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C\textsubscript{14}H\textsubscript{10}
Molecular Weight: 178.23 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenanthrene</td>
<td>85-01-8</td>
<td>201-581-5</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters
### Personal protective equipment

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.

**Eye protection**
Safety glasses with side-shields conforming to EN166

**Skin and body protection**
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- **Form** solid

**Safety data**
- **pH** no data available
- **Melting point** 98 - 100 °C (208 - 212 °F)
- **Boiling point** 340 °C (644 °F)
- **Flash point** no data available
- **Ignition temperature** no data available
- **Lower explosion limit** no data available
- **Upper explosion limit** no data available
- **Density** 1.063 g/mL at 25 °C (77 °F)
- **Water solubility** no data available
- **Partition coefficient: n-octanol/water** log Pow: 4.57

### 10. STABILITY AND REACTIVITY

**Chemical stability**
 Stable under recommended storage conditions.

**Conditions to avoid**
no data available

**Materials to avoid**
Oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides

### 11. TOXICOLOGICAL INFORMATION
Acute toxicity
LD50 Oral - mouse - 700.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Phenanthrene)
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

<table>
<thead>
<tr>
<th>route</th>
<th>effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>May be harmful if inhaled. Causes respiratory tract irritation.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Harmful if swallowed.</td>
</tr>
<tr>
<td>Skin</td>
<td>May be harmful if absorbed through skin. Causes skin irritation.</td>
</tr>
<tr>
<td>Eyes</td>
<td>Causes eye irritation.</td>
</tr>
</tbody>
</table>

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information

12. ECOLOGICAL INFORMATION

Toxicity

<table>
<thead>
<tr>
<th>Toxicity to fish</th>
<th>LC50</th>
<th>LC100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncorhynchus mykiss (rainbow trout)</td>
<td>3.2 mg/l</td>
<td>1.5 mg/l</td>
</tr>
<tr>
<td>other fish</td>
<td>1.5 mg/l</td>
<td>1.0 mg/l</td>
</tr>
</tbody>
</table>

Toxicity to daphnia
EC50 - Daphnia magna (Water flea) - 0.86 mg/l - 24 h
and other aquatic invertebrates.

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC50 - Daphnia magna (Water flea) - 0.38 mg/l - 48 h</td>
<td></td>
</tr>
<tr>
<td>EC50 - Chlorella vulgaris (Fresh water algae) - 1.20 mg/l - 3 h</td>
<td></td>
</tr>
</tbody>
</table>

**Persistence and degradability**

Biodegradability: Result: 55 - 95% - Partially biodegradable.

**Bioaccumulative potential**

Bioaccumulation:
- Pimephales promelas (fathead minnow) - 28 d
- Bioconcentration factor (BCF): 5,100

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms.

### 13. DISPOSAL CONSIDERATIONS

**Product**

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

### 14. TRANSPORT INFORMATION

**DOT (US)**

UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Phenanthrene)
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Inhalation Hazard: No

**IMDG**

UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Phenanthrene)
Marine pollutant: No

**IATA**

UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Phenanthrene)

**Further information**

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

### 15. REGULATORY INFORMATION

**OSHA Hazards**

Harmful by ingestion., Irritant

**DSL Status**

All components of this product are on the Canadian DSL list.
SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

<table>
<thead>
<tr>
<th>Phenanthrene</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-01-8</td>
<td>2007-07-01</td>
<td></td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Phenanthrene</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-01-8</td>
<td>2007-07-01</td>
<td></td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>85-01-8</td>
<td>2007-07-01</td>
<td></td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
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<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-01-8</td>
<td>2007-07-01</td>
<td></td>
</tr>
</tbody>
</table>

California Prop. 65 Components

<table>
<thead>
<tr>
<th>Phenanthrene</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-01-8</td>
<td>1990-01-01</td>
<td></td>
</tr>
</tbody>
</table>

WARNING! This product contains a chemical known to the State of California to cause cancer.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## PHENOL

**ICSC: 0070**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible.</td>
<td>NO open flames. NO contact with strong oxidants.</td>
<td>Alcohol-resistant foam, powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Above 79°C explosive vapour/air mixtures may be formed.</td>
<td>Above 79°C use a closed system, ventilation.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td>AVOID ALL CONTACT!</td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td>• EYES</td>
<td>Pain. Redness. Permanent loss of vision. Severe deep burns.</td>
<td>Face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

Carbolic acid  
Phenic acid  
Hydroxybenzene  
\( C_6H_6O / C_6H_5OH \)  
Molecular mass: 94.1

ICSC # 0070  
CAS # 108-95-2  
RTECS # SJ3325000  
UN # 1671  
EC # 604-001-00-2  
October 15, 2001 Validated

http://www.cdc.gov/niosh/ipcsneng/neng0070.html  
12/9/2011
### International Chemical Safety Cards

**PHENOL**

<table>
<thead>
<tr>
<th>I</th>
<th>PHYSICAL STATE; APPEARANCE: COLOURLESS TO YELLOW OR LIGHT PINK CRYSTALS, WITH CHARACTERISTIC ODOUR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>PHYSICAL DANGERS: Upon heating, toxic fumes are formed. The solution in water is a weak acid. Reacts with oxidants causing fire and explosion hazard.</td>
</tr>
<tr>
<td>P</td>
<td>CHEMICAL DANGERS: Upon heating, toxic fumes are formed. The solution in water is a weak acid. Reacts with oxidants causing fire and explosion hazard.</td>
</tr>
<tr>
<td>O</td>
<td>OCCUPATIONAL EXPOSURE LIMITS: TLV: 5 ppm as TWA; (skin); A4; BEI issued; (ACGIH 2004).</td>
</tr>
<tr>
<td>R</td>
<td>MAK: H; Carcinogen category: 3B; Germ cell mutagen group: 3B (DFG 2009).</td>
</tr>
<tr>
<td>T</td>
<td>OSHA PEL: TWA 5 ppm (19 mg/m³) skin</td>
</tr>
<tr>
<td>A</td>
<td>NIOSH REL: TWA 5 ppm (19 mg/m³) C 15.6 ppm (60 mg/m³) 15-minute skin</td>
</tr>
<tr>
<td>N</td>
<td>NIOSH IDLH: 250 ppm See: 108952</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 182°C
- Melting point: 43°C
- Density: 1.06 g/cm³
- Solubility in water: moderate
- Vapour pressure, Pa at 20°C: 47

**ROUTES OF EXPOSURE:**

The substance can be absorbed into the body rapidly by inhalation of its vapour, through the skin and by ingestion.

**INHALATION RISK:**

A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

**EFFECTS OF SHORT-TERM EXPOSURE:**

The substance and the vapour is corrosive to the eyes, the skin and the respiratory tract. Inhalation of vapour may cause lung oedema (see Notes). The substance may cause effects on the central nervous system, heart and kidneys, resulting in convulsions, coma, cardiac disorders respiratory failure, collapse. Exposure may result in death. The effects may be delayed. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys.

**RELATIVE DENSITY (AIR = 1):**

- 3.2

**RELATIVE DENSITY OF THE VAPOUR/AIR-MIXTURE AT 20°C (AIR = 1):**

- 1.001

**FLASH POINT:**

- 79°C c.c.

**AUTO-IGNITION TEMPERATURE:**

- 715°C

**EXPLOSIVE LIMITS, % VOL IN AIR:**

- 1.36-10

**OCTANOL/WATER PARTITION COEFFICIENT AS LOG Pow:**

- 1.46
## ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms.

## NOTES

Other UN numbers: 2312 (molten); 2821 (solution). Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered.

Transport Emergency Card: TEC (R)-61S1671

NFPA Code: H 3; F 2; R 0;

Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response.

Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.

## ADDITIONAL INFORMATION

ICSC: 0070

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**PHENOL**

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Benzo (d,e,f) phenanthrene  
\[ \text{beta-Pyrene} \]  
\[ \text{C}_{16}\text{H}_{10} \]  
Molecular mass: 202.26

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking.</td>
<td>Water spray, carbon dioxide, dry powder, alcohol-resistant foam, foam.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INHALATION</td>
<td>Avoid inhalation of dust</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td>SKIN</td>
<td>Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness.</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)</td>
<td>Separated from strong oxidants. Keep in a well-ventilated room.</td>
<td>Do not transport with food and feedstuffs.</td>
</tr>
</tbody>
</table>

R:
S:
### PHYSICAL DANGERS:

#### CHEMICAL DANGERS:
The substance decomposes on heating producing irritating fumes

#### OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK not established.

### INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

### EFFECTS OF SHORT-TERM EXPOSURE:
Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>404°C</td>
</tr>
<tr>
<td>Melting point</td>
<td>151°C</td>
</tr>
<tr>
<td>Density</td>
<td>1.27 g/cm³</td>
</tr>
<tr>
<td>Solubility</td>
<td>0.135 mg/l at 25°C</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>0.08 Pa at 20°C</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow</td>
<td>4.88</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA
Bioaccumulation of this chemical may occur in crustacea, in fish, in milk, in algae and in molluscs. It is strongly advised that this substance does not enter the environment.

### NOTES

Pyrene is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, pyrene may be encountered as a laboratory chemical in its pure form. Health effects of exposure to the substance have not been investigated adequately. See ICSC 1415 Coal-tar pitch.

### ADDITIONAL INFORMATION

**ICSC: 1474**

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**PYRENE**

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# International Chemical Safety Cards

## PYRIDINE

ICSC: 0323

[Images of safety symbols]

Azine  
Azabenzene  
C₅H₅N  
Molecular mass: 79.1

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0323</th>
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</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>110-86-1</td>
</tr>
<tr>
<td>RTECS #</td>
<td>UR8400000</td>
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<tr>
<td>UN #</td>
<td>1282</td>
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<tr>
<td>EC #</td>
<td>613-002-00-7</td>
</tr>
<tr>
<td>Validated</td>
<td>December 04, 2000</td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

#### ACUTE HAZARDS/SYMPTOMS

- **FIRE**  
  - Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.  
  - Prevention: NO open flames, NO sparks, and NO smoking.  
  - First Aid/Fire Fighting: Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.

- **EXPLOSION**  
  - Vapour/air mixtures are explosive.  
  - Prevention: Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.  
  - In case of fire: keep drums, etc., cool by spraying with water.

### EXPOSURE

#### INHALATION

- Prevention: Ventilation, local exhaust, or breathing protection.  
- First Aid/Fire Fighting: Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.

#### SKIN

- MAY BE ABSORBED! Redness. Burning sensation (further see Inhalation).  
- Prevention: Protective gloves. Protective clothing.  
- First Aid/Fire Fighting: Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

#### EYES

- Redness. Pain.  
- Prevention: Safety spectacles. or face shield.  
- First Aid/Fire Fighting: First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

#### INGESTION

- Prevention: Do not eat, drink, or smoke during work.  
- First Aid/Fire Fighting: Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer for medical attention.

### SPILLAGE DISPOSAL

- Personal protection: self-contained

### STORAGE

- Fireproof. Separated from strong

### PACKAGING & LABELLING
breathing apparatus. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer.


F symbol
Xn symbol
R: 11-20/21/22
S: 2-26-28
UN Hazard Class: 3
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0323

International Chemical Safety Cards

PYRIDINE

ICSC: 0323

PHYSICAL STATE: APPEARANCE:
COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic fumes (nitrogen oxides and hydrogen cyanide - see ICSC # 0492). The substance is a weak base. Reacts violently with strong oxidants and strong acids.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 1 ppm (as TWA)
A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2005).

MAK: skin absorption (H);
Carcinogen category: 3B (DFG 2009).

OSHA PEL: TWA 5 ppm (15 mg/m³)
NIOSH REL: TWA 5 ppm (15 mg/m³)
NIOSH IDLH: 1000 ppm See: 110861

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract. The substance may cause effects on the central nervous system and gastrointestinal tract. Exposure far above the OEL could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system, liver, kidneys.

PHYSICAL PROPERTIES
Boiling point: 115°C
Melting point: -42°C
Relative density (water = 1): 0.98
Solubility in water: miscible
Vapour pressure, kPa at 20°C: 2.0
Relative vapour density (air = 1): 2.73

Relative density of the vapour/air-mixture at 20°C (air = 1): 1.03
Flash point:
20°C c.c.
Auto-ignition temperature: 482°C
Explosive limits, vol% in air: 1.8-12.4
Octanol/water partition coefficient as log Pow: 0.65

ENVIRONMENTAL
The substance is harmful to aquatic organisms.

The substance is harmful to aquatic organisms.

http://www.cdc.gov/niosh/ipcsneng/neng0323.html

12/9/2011
Pyridine can normally be detected by odour at levels well below the TLV. However, perception of the odour may decline quickly. Depending on the degree of exposure, periodic medical examination is indicated.

Transport Emergency Card: TEC (R)-98

NFPA Code: H 2; F 3; R 0;
Card has been partially updated in January 2008: see Ingestion First Aid.
Card has been partially updated in April 2010: see Occupational Exposure Limits, Spillage Disposal.

ADDITIONAL INFORMATION

ICSC: 0323
PYRIDINE

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4,4'-DDD PESTANAL, 250 MG (2,2-BIS(4-CHL&

Product Number : 35486
Brand : Fluka

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion, Harmful by skin absorption, Possible carcinogen.

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H400 Very toxic to aquatic life.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin Harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Ingestion Toxic if swallowed.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
4,4'-DDD
TDE

Formula: \( \text{C}_{14}\text{H}_{10}\text{Cl}_{4} \)
Molecular Weight: 320.04 g/mol

<table>
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<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
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</thead>
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<tr>
<td>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</td>
<td>72-54-8</td>
<td>200-783-0</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe area.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
solid

Form

Safety data

pH  no data available
Melting point  94.0 - 96.0 °C (201.2 - 204.8 °F)
Boiling point  193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
Flash point  no data available
Ignition temperature  no data available
Lower explosion limit  no data available
Upper explosion limit  no data available
Vapour pressure  < 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
Density  1.38 g/cm³
Water solubility  no data available
Partition coefficient: n-octanol/water  log Pow: 6.02

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

11. TOXICOLOGICAL INFORMATION
Acute toxicity
LD50 Oral - Hamster - > 5,000 mg/kg
TDLo Oral - Human - 428.5 mg/kg
Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg

TDLo Oral - rat - 1.4 mg/kg

TDLo Oral - rat - 2,100 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion: Toxic if swallowed.
Skin: Harmful if absorbed through skin. May cause skin irritation.
Eyes
May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: KI0700000

12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to fish
LC50 - other fish - 1.18 - 9 mg/l - 96.0 h
LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates.
EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
Indication of bioaccumulation.

Mobility in soil
no data available

PDT and vPvD assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2811   Class: 6.1   Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811   Class: 6.1   Packing group: III
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

IATA
UN Number: 2811   Class: 6.1   Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

<table>
<thead>
<tr>
<th>CAS-No.</th>
</tr>
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<tbody>
<tr>
<td>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</td>
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</tbody>
</table>

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</td>
<td>72-54-8</td>
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</table>

Pennsylvania Right To Know Components

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</table>

New Jersey Right To Know Components

<table>
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<tr>
<th>CAS-No</th>
<th>Revision Date</th>
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<tbody>
<tr>
<td>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</td>
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</table>

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

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<thead>
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<th>CAS-No.</th>
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<tr>
<td>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</td>
<td>72 54 8</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers

[ 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% 72-55-9 ]

Suppliers:
Not Available

Buyers:
Not Available

*** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

+----------------+--------------------------------------+----------+-----------+
| CAS# | Chemical Name | % | EINECS# |
+----------------|--------------------------------------|----------|-----------+
| 72-55-9 | 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene | 99 | 200-784-6 |
+----------------+--------------------------------------+----------+-----------+

Hazard Symbols: XN
Risk Phrases: 22 33

*** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Harmful if swallowed. Danger of cumulative effects. Cancer suspect agent. Possible risks of irreversible effects.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation.
Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed. Ingestion of large amounts may cause liver and/or kidney damage.
Inhalation: May cause respiratory tract irritation.
Chronic: May cause cancer according to animal studies. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects.

*** SECTION 4 - FIRST AID MEASURES ****

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

*** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.

Extinguishing Media:
For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale. Use with adequate ventilation.
Storage:
Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits
CAS# 72-55-9:

Personal Protective Equipment
Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Crystals
Color: white
Odor: None reported.

pH: Not available.
Vapor Pressure: 6.5106 mm Hg @ 20 C
Viscosity: Not available.
Boiling Point: 336 deg C
Freezing/Melting Point: 88.00 - 90.00 deg C
Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
Decomposition Temperature:
Solubility in water: 0.010 ppm
Specific Gravity/Density:
Molecular Formula: C14H8Cl4
Molecular Weight: 318.02

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation, strong oxidants.
Incompatibilities with Other Materials:
Strong oxidizing agents - strong bases.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 72-55-9: KV9450000
LD50/ LC50:
CAS# 72-55-9: Oral, mouse: LD50 = 700 mg/kg; Oral, rat: LD50 = 880 mg/kg.
Carcinogenicity:
2,2'-Bis-(4-chlorophenyl)-1,1-dichloroethylene -
California: carcinogen, initial date 1/1/89

**SECTION 12 - ECOLOGICAL INFORMATION**

Ecotoxicity:
Estimated BCF value = 8,300 based on water solubility. Estimated Koc value = 8,300. There was no movement of DDE reported in soil column mobility experiments.

**SECTION 13 - DISPOSAL CONSIDERATIONS**

Dispose of in a manner consistent with federal, state, and local regulations.

**SECTION 14 - TRANSPORT INFORMATION**

IATA
Not regulated as a hazardous material.

IMO
Not regulated as a hazardous material.

RID/ADR
Not regulated as a hazardous material.

USA RQ: CAS# 72-55-9: 1 lb final RQ; 0.454 kg final RQ

**SECTION 15 - REGULATORY INFORMATION**

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 22 Harmful if swallowed.
R 33 Danger of cumulative effects.
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
WGK (Water Danger/Protection)
CAS# 72-55-9: 3

Canada
None of the chemicals in this product are listed on the DSL/NDSL list.
CAS# 72-55-9 is listed on Canada's Ingredient Disclosure List.

US FEDERAL
TSCA
CAS# 72-55-9 is not listed on the TSCA inventory.
It is for research and development use only.

**SECTION 16 - ADDITIONAL INFORMATION**

MSDS Creation Date: 9/28/1998 Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

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Search More 72-55-9 msds

ALL MSDS PAGES IN THIS GROUP

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<td>M-Benzoxylbenzyl Alcohol , 97%</td>
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<tr>
<td>Octaphenylcyclotetrasiloxane, 98%</td>
<td>546-56-5</td>
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<td>Cetylpyridinium chloride</td>
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<td>3,4-Difluorophenol, 99%</td>
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<td>1-Benzyl-4-hydroxyperidine, 97%</td>
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<td>4-tert-Butylbenzyl chloride</td>
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<td>Borane-morpholine complex, 97%</td>
<td>4856-95-5</td>
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<td>Benzyl Ether, 99%</td>
<td>103-50-4</td>
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<td>5-Amino-1-Naphtol (Pract)</td>
<td>83-55-6</td>
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<tr>
<td>Pyridinium-P-Toluenesulfonate 98%</td>
<td>24057-28-1</td>
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<td>Pyrogallol Red, 98% (Titr.)</td>
<td>32638-88-3</td>
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<td>Amberlite ira 410</td>
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<td>3-Methoxybenzonitrile, 98%</td>
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<td>1-Adamantanemethanol, 99%</td>
<td>770-71-8</td>
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<tr>
<td>Inosine, 99%</td>
<td>58-63-9</td>
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<tr>
<td>Pentfluoropropionic Acid</td>
<td>422-64-0</td>
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<tr>
<td>Pyruvic Acid</td>
<td>127-17-3</td>
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<tr>
<td>Potassium hydrogen fluoride, 99+%</td>
<td>7789-29-9</td>
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<td>Aluminum Nitride, 98% Particle Size &lt;10 Micron</td>
<td>24304-00-5</td>
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<td>Nickel(II) hydroxide, c.p., 60-61% Ni</td>
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<td>1-Adamantanamine sulfate, 99%</td>
<td>31377-23-8</td>
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<tr>
<td>S-(Thiobenzyl)-Thioglycolic Acid, 97%</td>
<td>942-91-6</td>
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<tr>
<td>N,N-Dimethyl-P-Nitroaniline</td>
<td>100-23-2</td>
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<td>Benzofuroxan</td>
<td>480-96-6</td>
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<td>co-3-Aminomethyl-1-cyclohexanol hydrochloride, 99%</td>
<td>24947-68-0</td>
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<tr>
<td>Silver Phosphate, 98% (Titr.)</td>
<td>7784-09-0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
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<th>CAS Number</th>
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<tr>
<td>4-Cyano-4-Phenylpiperidine Hydrochloride, 99% (TLC)</td>
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<td>Methanesulfonamide</td>
<td>3144-09-0</td>
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<td>gamma-Octanolic lactone, 98%</td>
<td>104-50-7</td>
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<td>cis,cis,cis,cis-1,2,3,4-cyclopentane- tetracarboxylic dianhydride</td>
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</tr>
<tr>
<td>Tetrachloroethylene Carbonate, 98+%</td>
<td>22432-68-4</td>
</tr>
<tr>
<td>Oxamic Acid, 98%</td>
<td>471-47-6</td>
</tr>
<tr>
<td>10,11-Dihydro-5H-Dibenzo(A,D)-Cycloheptene, 98%</td>
<td>833-48-7</td>
</tr>
<tr>
<td>Thallium (I) Sulfate, 99.9+%</td>
<td>7446-18-6</td>
</tr>
<tr>
<td>N-[2,6-Dimethylphenylcarbamoyl-Methyl]-lminodiacetic Acid, 99%</td>
<td>59160-29-1</td>
</tr>
<tr>
<td>P-[Dimethylaminocinnamic Acid, 99%</td>
<td>1552-96-1</td>
</tr>
<tr>
<td>Biebrich Scarlet, 99% (UV-VIS)</td>
<td>4196-99-0</td>
</tr>
<tr>
<td>4-Chlorobenzenediazonium hexafluoro- phosphate</td>
<td>1582-27-0</td>
</tr>
<tr>
<td>Ammonium hexachloridate(IV), 99.99%</td>
<td>16940-92-4</td>
</tr>
<tr>
<td>Methylamine-d2 deuteriochloride, 98+ atom % D</td>
<td>593-51-1</td>
</tr>
<tr>
<td>2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%</td>
<td>72-55-9</td>
</tr>
<tr>
<td>Nitro red</td>
<td>56431-61-9</td>
</tr>
<tr>
<td>Methyl 2,3-dichlorobenzoate, 98+ %</td>
<td>2905-54-6</td>
</tr>
<tr>
<td>Isopropyl Bromoacetate, 98% (GC)</td>
<td>29921-57-1</td>
</tr>
<tr>
<td>1-Iodo-4-Nitrobenzene, 99%</td>
<td>636-98-6</td>
</tr>
<tr>
<td>4-Ethylcyclohexanol, 99% cis/trans mixture</td>
<td>4534-74-1</td>
</tr>
<tr>
<td>Fluorescamine</td>
<td>38183-12-9</td>
</tr>
<tr>
<td>Tris(2,2,6,6-Tetramethyl-3,5-Hexanedionato)Dysprosium(III), 99+9%</td>
<td>15522-69-7</td>
</tr>
<tr>
<td>3-Amino-2,2,5,5-Tetramethyl-1-Pyrrolidinol, 99% (Tet.)</td>
<td>34272-83-8</td>
</tr>
<tr>
<td>3,4-Dihydroxyphenylacetic Acid, 98%</td>
<td>102-32-9</td>
</tr>
</tbody>
</table>

Free MSDS Search (Providing 250,000+ Material Properties)
Chemcas Copyright Reserved

11/29/2011
DDT

Dichlorodiphenyltrichloroethane
1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane
1,1’-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)
p,p’-DDT
C₁₄H₉Cl₅
Molecular mass: 354.5

**TYPES OF HAZARD/EXPOSURE**

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
</tbody>
</table>

**EXPLOSION**

PREVENT DISPERSION OF DUST!
STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!

**EXPOSURE**

| INHALATION | Cough. | Local exhaust or breathing protection. | Fresh air, rest. |
| SKIN | Protective gloves. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| EYES | Redness. | Safety goggles, or eye protection in combination with breathing protection if powder. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

**SPILLAGE DISPOSAL**
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.

**STORAGE**
Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.

**PACKAGING & LABELLING**

SEE IMPORTANT INFORMATION ON BACK
Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

**DDT**

**ICSC: 0034**

**PHYSICAL STATE; APPEARANCE:**
COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminium and iron.

**PHYSICAL PROPERTIES**
Boiling point: 260°C
Melting point: 109°C
Density: 1.6 g/cm³

**Solubility in water:** poor
**Octanol/water partition coefficient as log Pow:** 6.36

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g., through inappropriate disposal.

**NOTES**
Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

**ADDITIONAL INFORMATION**

**ICSC: 0034**

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# International Chemical Safety Cards

## ALDRIN

1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-exo-1,4-endo-5,8-dimethanonaphthalene
1,45,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-,
(1alpha,4alpha,4aβ,5alpha,8alpha,8aβ)

HHDN

C₁₂H₈Cl₆

Molecular mass: 364.9

### ACUTE HAZARDS/ SYMPTOMS

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/ EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: all extinguishing agents allowed.</td>
<td></td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• INHALATION</td>
<td>(See Ingestion).</td>
<td>Ventilation (not if powder).</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! See Ingestion.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Safety goggles, or face shield.</td>
<td></td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).

### STORAGE

Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs. Severe marine pollutant.

T symbol

N symbol

R: 24/25-40-48/24/25-50/53

S: 1/2-22-36/37-45-60-61

UN Hazard Class: 6.1

UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK
**ALDRIN**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>COLOURLESS CRYSTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride. Reacts with acids and oxidants. Attacks many metals in presence of water.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV: 0.25 mg/m³ (as TWA), A3 (skin) (ACGIH 1997). MAK; (Inhalable fraction) 0.25 mg/m³; skin absorption (H); Peak limitation category: II(8) (DFG 2006). OSHA PEL: TWA 0.25 mg/m³ skin NIOSH REL: Ca TWA 0.25 mg/m³ skin See Appendix A NIOSH IDLH: Ca 25 mg/m³ See: 309002</td>
</tr>
<tr>
<td>ROUTES OF EXPOSURE:</td>
<td>The substance can be absorbed into the body through the skin and by ingestion.</td>
</tr>
<tr>
<td>INHALATION RISK:</td>
<td>Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</td>
</tr>
<tr>
<td>EFFECTS OF SHORT-TERM EXPOSURE:</td>
<td>The substance may cause effects on the central nervous system, resulting in convulsions. The effects may be delayed. Medical observation is indicated.</td>
</tr>
<tr>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</td>
<td>The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Boiling point at 0.27kPa</th>
<th>145°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point</td>
<td>104-105°C</td>
</tr>
<tr>
<td>Density</td>
<td>1.6 g/cm³</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>none</td>
</tr>
<tr>
<td>Vapour pressure, Pa at 20°C</td>
<td>0.009</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow</td>
<td>7.4</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds, honey bees. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.

**NOTES**

Other melting points: 49-60°C (technical grade). Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. The recommendations on this Card also apply to ICSC 0787 (dieldrin). Aldrec, Aldrex, Aldrite, Aldron, Aldrosol, Algran, Altox, Drinox, Octalene, Seedrin, and Toxadrin are trade names.

Transport Emergency Card: TEC (R)-61G41b.

NFPA Code: H2; F0; R0;

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0774**

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## International Chemical Safety Cards

### alpha-HEXACHLOROCYCLOHEXANE

**alpha-1,2,3,4,5,6-Hexachlorocyclohexane**  
**alpha-Benzenehexachloride (alpha-BHC)**  
**alpha-Hexachloran**  

\[ \text{C}_6\text{H}_6\text{Cl}_6 \]

Molecular mass: 290.8

**ICSC** # 0795  
**CAS** # 319-84-6  
**RTECS** # GV3500000  
**UN** # 2761  
**EC** # 602-042-00-0  
November 25, 2009 Validated

---

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPOMTS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLOSION</th>
<th>ACUTE HAZARDS/SYMPOMTS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of fire and explosion. If formulations contain flammable/explosive solvents</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPOSURE

#### INHALATION

Cough. Sore throat. See Ingestion.  
Avoid inhalation of dust  
Fresh air, rest. Seek medical attention if you feel unwell

#### SKIN

MAY BE ABSORBED!  
Protective gloves. Protective clothing.  
Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse and then wash skin with water and soap. Seek medical attention if you feel unwell

#### EYES

Redness.  
Face shield or eye protection in combination with breathing protection.  
Rinse with plenty of water (remove contact lenses if easily possible).

#### INGESTION

Do not eat, drink, or smoke during work. Wash hands before eating.  
Rinse mouth. Give a slurry of activated charcoal in water to drink, NOT if convulsions occur. Refer immediately for medical attention.

---

### SPILLAGE DISPOSAL

Personal protection: filter respirator for organic gases and particulates adapted to the airborne concentration of the substance, chemical protection suit including self-contained breathing apparatus, protective gloves. Do NOT let this chemical enter the environment. Sweep spilled substance into non-metallic, sealable containers; if

### STORAGE

Well closed. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. Separated from bases, metals, food and feedstuffs.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Note: C  
T symbol  
N symbol  
R: 21-25-40-50/53  
S: 1/2-22-37-45-60-61  
UN Hazard Class: 6.1  
UN Packing Group: III
appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

Signal: Danger
Skull-Health haz-Enviro
Toxic if swallowed
May be harmful in contact with skin
Suspected of causing cancer
May cause harm to the breast-fed children
Causes damage to central nervous system
May cause damage to liver and kidney through prolonged or repeated exposure
Very toxic to aquatic life with long-lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0795
Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

alpha-HEXACHLOROCYCLOHEXANE

PHYSICAL STATE; APPEARANCE:
BROWN, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on contact with hot surfaces or flames, producing toxic and corrosive fumes including chlorine, hydrogen chloride and phosgene,

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK: (Inhalable fraction), 0.5 mg/m³;
Peak limitation category: II(8);
skin absorption (H); (DFG 2009).
see Notes

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the central nervous system, resulting in convulsions

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system, kidneys and liver. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES
Boiling point: 288°C
Melting point: 157-160°C
Density: 1.9 g/cm³

Solubility in water: (very poor)
Vapour pressure, Pa at 20°C: 0.003
Relative vapour density (air = 1): 10
Octanol/water partition coefficient as log Pow: 3.8

ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain, for example in fish and in seafood. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

NOTES
This substance is a component of the insecticide hexachlorocyclohexane (mixed isomers). Carrier solvents used in commercial formulations may change physical and toxicological properties. The symptoms of convulsions do not become manifest until 0.5 to several hours. Do NOT take working clothes home. Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Occupational Exposure Limits: MAK value is for technical mixture of alpha and beta isomers (0.5 mg/m³=(Conc.alpha-HCH divided by 5) + Conc beta-HCH)

ICSC: 0795   alpha-HEXACHLOROCYCLOHEXANE

(C) IPCS, CEC, 1994

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name: α-Chlordane
Product Number: 442449
Brand: Supelco
Product Use: For laboratory research purposes.
Supplier: Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Manufacturer: Sigma-Aldrich Corporation 3050 Spruce St. St. Louis, Missouri 63103 USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer): (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

GHS Classification
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Oral (Category 4)
Acute toxicity, Dermal (Category 3)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)
Acute aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H302 + H332 Harmful if swallowed or if inhaled.
H311 Toxic in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.

**HMIS Classification**
- Health hazard: 2
- Flammability: 0
- Physical hazards: 0

**NFPA Rating**
- Health hazard: 2
- Fire: 0
- Reactivity Hazard: 0

**Potential Health Effects**
- **Inhalation**: Toxic if inhaled. Causes respiratory tract irritation.
- **Skin**: Toxic if absorbed through skin. Causes skin irritation.
- **Eyes**: Causes eye irritation.
- **Ingestion**: Toxic if swallowed.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Molecular Weight**
- 208.29 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>5103-71-9</td>
<td>225-825-5</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self-contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form crystalline
Colour colourless

Safety data
pH no data available
Melting/freezing point 93.0 - 94.0 °C (199.4 - 201.2 °F)
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 500.0 mg/kg

Inhalation LC50
Dermal LD50

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

| Inhalation | Toxic if inhaled. Causes respiratory tract irritation. |
| Ingestion  | Toxic if swallowed.                                    |
| Skin       | Toxic if absorbed through skin. Causes skin irritation.|
| Eyes       | Causes eye irritation.                                 |

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish LC50 - Lepomis macrochirus (Bluegill) - 0.0074 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation Lepomis macrochirus (Bluegill) - 24 h
Bioconcentration factor (BCF): 322

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.
no data available

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3077  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chlordane)
Marine pollutant:
Poison inhalation Hazard: No

IMDG
UN-Number: 3077  Class: 9  Packing group: III  EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chlordane)
Marine pollutant: Marine pollutant

IATA
UN-Number: 3077  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chlordane)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by inhalation, Toxic by ingestion, Toxic by skin absorption, Irritant

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.  

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlordane</td>
<td>5103-71-9</td>
</tr>
</tbody>
</table>

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
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New Jersey Right To Know Components

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</thead>
<tbody>
<tr>
<td>Chlordane</td>
<td>5103-71-9</td>
<td></td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## beta-HEXACHLOROCYCLOHEXANE

**ICSC:** 0796

1-alpha,2-beta,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane  
*beta-1,2,3,4,5,6-Hexachlorocyclohexane*  
*beta-Benzenehexachloride (beta-BHC)*  

\[ C_6H_6Cl_6 \]

Molecular mass: 290.8

| ICSC # | 0796 |
| CAS #  | 319-85-7 |
| RTECS # | GV4375000 |
| UN #   | 2761 |
| EC #   | 602-042-00-0 |

November 25, 2009 Validated

## TYPES OF HAZARD/EXPOSURE

### ACUTE HAZARDS/SYMPTOMS

### PREVENTION

### FIRST AID/FIRE FIGHTING

| FIRE | Not combustible. Gives off irritating or toxic fumes (or gases) in a fire. | In case of fire in the surroundings: use appropriate extinguishing media. |
| EXPLOSION | Risk of fire and explosion if formulations contain flammable/explosive solvents | In case of fire: keep drums, etc., cool by spraying with water. |

## EXPOSURE

- **INHALATION**  
  Cough. Sore throat. See Ingestion.  
  Avoid inhalation of dust  
  Fresh air, rest. Seek medical attention if you feel unwell.

- **SKIN**  
  MAY BE ABSORBED!  
  Protective gloves. Protective clothing.  
  Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse and then wash skin with water and soap. Seek medical attention if you feel unwell.

- **EYES**  
  Redness.  
  Face shield or eye protection in combination with breathing protection if powder.  
  First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**  
  Do not eat, drink, or smoke during work. Wash hands before eating.  
  Rinse mouth. Give a slurry of activated charcoal in water to drink, NOT if convulsions occur. Refer immediately for medical attention.

## SPILLAGE DISPOSAL

- Personal protection: filter respirator for organic gases and particulates adapted to the airborne concentration of the substance, chemical protection suit including self-contained breathing apparatus, protective gloves. Do NOT let this chemical enter the environment. Sweep spilled substance into non-metallic, sealable containers; if appropriate, moisten first to prevent dusting.

## STORAGE

- Well closed. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. Separated from bases, metals, food and feedstuffs.

## PACKAGING & LABELLING

- Do not transport with food and feedstuffs.
  - Note: C  
  - T symbol  
  - N symbol  
  - R: 21-25-40-50/53  
  - S: 1/2-22-36/37-45-60-61  
  - UN Hazard Class: 6.1  
  - UN Packing Group: III  
  - Signal: Danger
ICSC: NENG 0796

International Chemical Safety Cards

beta-HEXACHLOROCYCLOHEXANE

**ICSC: 0796**

**PHYSICAL STATE; APPEARANCE:**
WHITE CRYSTALLINE POWDER.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on contact with hot surfaces or flames, producing toxic and corrosive fumes including chlorine, hydrogen chloride and phosgene,

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.
MAK: (Inhalable fraction) 0.5 mg/m³;
Peak limitation category: II(8);
skin absorption (H); (DFG 2009).
(See Notes)

**INHALATION RISK:**
A harmful concentration of airborne particles can be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The substance may cause effects on the central nervous system resulting in convulsions

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the central nervous system. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

**PHYSICAL PROPERTIES**
- Boiling point at 0.07kPa: 60°C
- Melting point: 309°C
- Density: 1.9 g/cm³
- Solubility in water: (very poor)
- Vapour pressure, Pa at 20°C: 0.7
- Octanol/water partition coefficient as log Pow: 3.8

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain, for example in fish and in seafood. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

**NOTES**
This substance is a component of the insecticide hexachlorocyclohexane (isomer mixture). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Occupational Exposure Limits : MAK value is for technical mixture of alpha and beta isomers (0.5 mg/m³=(Conc.alpha-HCH divided by 5) + Conc beta-HCH)
<table>
<thead>
<tr>
<th>ICSC: 0796</th>
<th>beta-HEXACHLOROCYCLOHEXANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
</tr>
</tbody>
</table>

**IMPORTANT LEGAL NOTICE:**
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

**CHLORDANE (TECHNICAL PRODUCT)**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Alcohol-resistant foam, powder, carbon dioxide.</td>
</tr>
</tbody>
</table>

| EXPLOSION               | PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN! | IN ALL CASES CONSULT A DOCTOR! |

| INHALATION              | Breathing protection. | Fresh air, rest. Refer for medical attention. |
| SKIN                    | MAY BE ABSORBED!     | Protective gloves. Protective clothing. Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| EYES                    | Redness. Pain.       | Safety goggles face shield or eye protection in combination with breathing protection. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0740

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

**ICSC: 0740**

### PHYSICAL STATE; APPEARANCE:

**TECHNICAL:** LIGHT YELLOW TO AMBER VISCOUS LIQUID

### PHYSICAL DANGERS:

**CHEMICAL DANGERS:**

The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene, hydrogen chloride. Attacks iron, zinc, plastic, rubber and coatings.

### OCCUPATIONAL EXPOSURE LIMITS:

**TLV:** 0.5 mg/m³ as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).

**MAK:** (Inhalable fraction) 0.5 mg/m³

**Peak limitation category:** II(8);

**Skin absorption (H);**

**Carcinogen category:** 3B;

(DFG 2004).

**OSHA PEL:** TWA 0.5 mg/m³ skin

**NIOSH REL:** Ca TWA 0.5 mg/m³ skin See Appendix A

**NIOSH IDLH:** Ca 100 mg/m³ See: 57749

### ROUTES OF EXPOSURE:

The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

### INHALATION RISK:

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.

### EFFECTS OF SHORT-TERM EXPOSURE:

Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

The substance may have effects on the liver immune system, resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES

- **Boiling point at 0.27kPa:** 175°C
- **Relative density (water = 1):** 1.59-1.63
- **Solubility in water:** none
- **Vapour pressure, Pa at 25°C:** 0.0013
- **Octanol/water partition coefficient as log Pow:** 2.78

### ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.

### NOTES

If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox, Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclor, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

**ICSC: 0740**

(C) IPCS, CEC, 1994
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: 5-BHC
Product Number: 48495
Brand: Supelco
Product Use: For laboratory research purposes.
Supplier: Sigma-Aldrich
Manufacturer: Sigma-Aldrich Corporation
Supplier Address: 3050 Spruce Street
Manufacturer Address: Saint Louis, Missouri 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer): (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Toxic by ingestion, Harmful by skin absorption.

Target Organs
Central nervous system

GHS Classification
Acute toxicity, Oral (Category 3)
Acute toxicity, Dermal (Category 4)
Carcinogenicity (Category 2)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS
Synonyms : 0-1,2,3,4,5,6-Hexachlorocyclohexane
Formula : C6H6Cl6
Molecular Weight : 290.8 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>319-86-8</td>
<td>206-272-9</td>
<td>602-042-00-0</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES
Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE
Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form solid
Colour no data available

Safety data
pH no data available
Melting/freezing point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 1,000 mg/kg

Inhalation LC50
no data available

Dermal LD50
Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion Toxic if swallowed.
Skin May cause skin irritation.
Eyes May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: GV4550000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish LC50 - other fish - 2.83 mg/l - 96.0 h

Persistence and degradability
no data available
Bioaccumulative potential
 Bioaccumulation of other fish - 33 d
 Bioconcentration factor (BCF): 326

Mobility in soil
 no data available

PBT and vPvB assessment
 no data available

Other adverse effects
 An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
 Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
 Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
 Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
 UN-Number: 3077  Class: 9  Packing group: III
 Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane
 Reportable Quantity (RQ): 1 lbs
 Marine pollutant: No
 Poison Inhalation Hazard: No

IMDG
 UN-Number: 3077  Class: 9  Packing group: III  EMS-No: F-A, S-F
 Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane
 Marine pollutant: No

IATA
 UN-Number: 3077  Class: 9  Packing group: III
 Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane

Further information
 CI I3-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
 Carcinogen, Toxic by ingestion, Harmful by skin absorpton.

DSL Status
 This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

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SARA 302 Components
 SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components

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16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
## International Chemical Safety Cards

### DIELDRIN

ICSC: 0787

**1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-1,4-exo-5,8-dimethanonaphthalene**

**3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2ß,2aalpha,3ß,6ß,6aalpha,7ß,7aalpha)-2,7,6-dimethanonaphth(2,3-b)oxirene**

HEOD

\[C_{12}H_8Cl_6O\]

Molecular mass: 380.9

ICSC # 0787  
CAS # 60-57-1  
RTECS # IO1750000  
UN # 2761  
EC # 602-049-00-9  
March 26, 1998 Validated

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Types of Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fire</strong></td>
<td>Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: all extinguishing agents allowed.</td>
<td></td>
</tr>
<tr>
<td><strong>Explosion</strong></td>
<td>PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td>(See Ingestion). Ventilation (not if powder).</td>
<td></td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>MAY BE ABSORBED! See Ingestion. Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
<td></td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td>Safety goggles, or face shield.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
</tbody>
</table>

### Spillage Disposal

Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).

### Storage

Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.

### Packaging & Labelling

Do not transport with food and feedstuffs.  
Severe marine pollutant.  
T+ symbol  
N symbol  
S: 1/2-22-36/37-45-60-61  
UN Hazard Class: 6.1  
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK
**International Chemical Safety Cards**

**DIELDRIN**

**ICSC: 0787**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>COLOURLESS CRYSTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>The substance decomposes on heating producing toxic fumes including hydrogen chloride. Reacts with oxidants and acids. Attacks metal due to the slow formation of hydrogen chloride in storage.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td></td>
</tr>
<tr>
<td>TLV (as TWA): 0.25 mg/m³, A4 (skin) (ACGIH 1997).</td>
<td></td>
</tr>
<tr>
<td>MAK, (Inhalable fraction) 0.25 mg/m³ :</td>
<td></td>
</tr>
<tr>
<td>Peak limitation category: II(8) skin absorption (H); (DFG 2007).</td>
<td></td>
</tr>
<tr>
<td>OSHA PEL: TWA 0.25 mg/m³ skin</td>
<td></td>
</tr>
<tr>
<td>NIOSH REL: Ca TWA 0.25 mg/m³ skin See Appendix A</td>
<td></td>
</tr>
<tr>
<td>NIOSH IDLH: Ca 50 mg/m³ See: 60571</td>
<td></td>
</tr>
<tr>
<td>ROUTES OF EXPOSURE:</td>
<td>The substance can be absorbed into the body through the skin and by ingestion.</td>
</tr>
<tr>
<td>INHALATION RISK:</td>
<td>Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</td>
</tr>
<tr>
<td>EFFECTS OF SHORT-TERM EXPOSURE:</td>
<td>The substance may cause effects on the central nervous system, resulting in convulsions. Medical observation is indicated.</td>
</tr>
<tr>
<td>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</td>
<td>The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</td>
</tr>
<tr>
<td>PHYSICAL PROPERTIES</td>
<td></td>
</tr>
<tr>
<td>Melting point: 175-176°C</td>
<td></td>
</tr>
<tr>
<td>Density: 1.7 g/cm³</td>
<td></td>
</tr>
<tr>
<td>Solubility in water: none</td>
<td></td>
</tr>
<tr>
<td>Vapour pressure, Pa at 20°C: 0.0004</td>
<td></td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow: 6.2</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL DATA</td>
<td>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees, birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.</td>
</tr>
</tbody>
</table>

**NOTES**

Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alvit, Dieldrex, Dieldrite, Illoxxol, Octalox, Panoram, and Quintox are trade names. Also consult ICSC #0774, Aldrin.

Transport Emergency Card: TEC (R)-61G41b.

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0787**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: α-Endosulfan
Product Number: 45468
Brand: Fluka
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion

GHS Label elements, including precautionary statements

Pictogram

Signal word DANGER

Hazard statement(s)
H301 Toxic if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 2
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C9H6Cl6O3S
Molecular Weight: 406.93 g/mol
### 4. FIRST AID MEASURES

**General advice**
Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form crystalline
Colour white

Safety data
pH no data available
Melting point 108.0 - 110.0 °C (226.4 - 230.0 °F)
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Water solubility insoluble

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 76.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion Toxic if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Additional Information
RTECS: RB9275100

12. ECOLOGICAL INFORMATION
Toxicity
Persistence and degradability
Bioaccumulative potential
Bioaccumulation other fish - 21 d
Bioconcentration factor (BCF): 10,994

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION
DOT (US)
UN-Number: 2811  Class: 6.1  Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s.
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811  Class: 6.1  Packing group: III  EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S.
Marine pollutant: No

IATA
UN-Number: 2811  Class: 6.1  Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s.

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Endosulfan (α isomer)  
CAS-No. 959-98-8

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

Endosulfan (α isomer)  
CAS-No. 959-98-8
Revision Date 1993-04-24

Pennsylvania Right To Know Components

Endosulfan (α isomer)  
CAS-No. 959-98-8
Revision Date 1993-04-24

New Jersey Right To Know Components

Endosulfan (α isomer)  
CAS-No. 959-98-8
Revision Date 1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: beta-Endosulfan
Product Number: 33385
Brand: Fluka
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion

Target Organs
Central nervous system, Eyes, Blood, Liver, Kidney

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H301 Toxic if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Toxic if swallowed.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>beta-Endosulfan</td>
<td>33213-65-9</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Molecular Weight : 406.9 g/mol

Formula : C9H8Cl6O3S

4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

**Environmental precautions**
Do not let product enter drains.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves.
Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form solid

Safety data
pH no data available
Melting point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Water solubility no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 240.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a
carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation  May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion   Toxic if swallowed.
Skin       May be harmful if absorbed through skin. May cause skin irritation.
Eyes       May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: RB9875200

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish  LC50 - other fish - 0.0066 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.

Persistence and degradability

Bioaccumulative potential
Bioaccumulation  other fish - 21 d
Bioconcentration factor (BCF): 0.008

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION
15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>beta-Endosulfan</td>
<td>33213-65-9</td>
</tr>
</tbody>
</table>

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>beta-Endosulfan</td>
<td>33213-65-9</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>beta-Endosulfan</td>
<td>33213-65-9</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
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<tr>
<td>beta-Endosulfan</td>
<td>33213-65-9</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Endosulfan sulfate

Product Number: 48580
Brand: Supelco
Product Use: For laboratory research purposes.

Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA

Manufacturer: Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Highly toxic by ingestion

GHS Classification
Acute toxicity, Oral (Category 2)
Acute aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H300  Fatal if swallowed.
H400  Very toxic to aquatic life.

Precautionary statement(s)
P264  Wash hands thoroughly after handling.
P273  Avoid release to the environment.
P301 + P310  IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification
Health hazard: 3
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 3
Fire: 0
Reactivity Hazard: 0
### Potential Health Effects

#### Inhalation
May be harmful if inhaled. May cause respiratory tract irritation.

#### Skin
May be harmful if absorbed through skin. May cause skin irritation.

#### Eyes
May cause eye irritation.

#### Ingestion
May be fatal if swallowed.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Formula</th>
<th>C₂H₆Cl₆O₄S C₂H₆Cl₆O₄S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>422.92 g/mol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1031-07-8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

#### General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

#### In case of eye contact
Flush eyes with water as a precaution.

#### If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 5. FIRE-FIGHTING MEASURES

#### Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

#### Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

#### Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

#### Environmetrical precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

#### Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 7. HANDLING AND STORAGE

#### Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

#### Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
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<tr>
<td>Colour</td>
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**Safety data**

<table>
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<th>Value</th>
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</thead>
<tbody>
<tr>
<td>pH</td>
<td>no data available</td>
</tr>
<tr>
<td>Melting/freezing point</td>
<td>179.0 - 182.0 °C (354.2 - 359.6 °F)</td>
</tr>
<tr>
<td>Boiling point</td>
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</tr>
<tr>
<td>Flash point</td>
<td>no data available</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Lower explosion limit</td>
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</tr>
<tr>
<td>Upper explosion limit</td>
<td>no data available</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>no data available</td>
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<tr>
<td>Density</td>
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<tr>
<td>Water solubility</td>
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<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>log Pow: 3.66</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>no data available</td>
</tr>
<tr>
<td>Odour</td>
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</tr>
<tr>
<td>Odour Threshold</td>
<td>no data available</td>
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</tbody>
</table>
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 18.0 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity
no data available
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

- **Inhalation**: May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion**: May be fatal if swallowed.
- **Skin**: May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes**: May cause eye irritation.

Signs and Symptoms of Exposure
Cholinesterase inhibitors can cause heavy salivation and secretion in the lungs, lachrymation, blurred vision, involuntary defecation, diarrhea, tremor, ataxia, sweating, hypothermia, lowered heart rate, and/or a fall in blood pressure as a result of their action at cholinergic nerve sites., Headache, Nausea, Vomiting, Dizziness, Drowsiness, Confusion, Weakness, Muscle cramps/spasms., Change in pupil size., Fever, Seizures., Incoordination., Convulsions, Coma.

Additional Information
RTECS: RB9150000

12. ECOLOGICAL INFORMATION

**Toxicity**

- **Toxicity to fish**
  - LC50 - Carassius auratus (goldfish) - > 0.01 - < 0.1 mg/l - 48.0 h
  - LC50 - Leuciscus idus (Golden orfe) - > 0.01 - < 0.1 mg/l - 48.0 h
  - LC50 - other fish - > 0.001 - < 0.01 mg/l - 48.0 h
- **Toxicity to daphnia and other aquatic invertebrates**
  - EC50 - Daphnia magna (Water flea) - 0.76 mg/l - 48 h
  - LC50 - Daphnia magna (Water flea) - > 0.1 - < 1 mg/l - 48 h

**Persistence and degradability**
no data available

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

**DOT (US)**
- UN-Number: 2811
- Class: 6.1
- Packing group: II
- Proper shipping name: Toxic solids, organic, n.o.s. (Endosulfan sulfate)
- Reportable Quantity (RQ): 1 lbs
- Marine pollutant: No
- Poison Inhalation Hazard: No

**IMDG**
- UN-Number: 2811
- Class: 6.1
- Packing group: II
- EMS-No: F-A, S-A
- Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Endosulfan sulfate)
- Marine pollutant: No

**IATA**
- UN-Number: 2811
- Class: 6.1
- Packing group: II
- Proper shipping name: Toxic solid, organic, n.o.s. (Endosulfan sulfate)

15. REGULATORY INFORMATION

**OSHA Hazards**
- Highly toxic by ingestion

**DSL Status**
- This product contains the following components that are not on the Canadian DSL nor NDSL lists.
- **Endosulfan sulfate**
  - CAS-No.: 1031-07-8

**SARA 302 Components**
- SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
- SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
- Acute Health Hazard

**Massachusetts Right To Know Components**
- **Endosulfan sulfate**
  - CAS-No.: 1031-07-8
  - Revision Date: 2007-03-01

**Pennsylvania Right To Know Components**
- **Endosulfan sulfate**
  - CAS-No.: 1031-07-8
  - Revision Date: 2007-03-01

**New Jersey Right To Know Components**
- **Endosulfan sulfate**
  - CAS-No.: 1031-07-8
  - Revision Date: 2007-03-01

**California Prop. 65 Components**
- This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

**Further information**
- Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
- The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
## International Chemical Safety Cards

### ENDRIN

**C₁₂H₈Cl₆O**  
Molecular mass: 380.9

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>1023</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>72-20-8</td>
</tr>
<tr>
<td>RTECS #</td>
<td>IO1575000</td>
</tr>
<tr>
<td>UN #</td>
<td>2761</td>
</tr>
<tr>
<td>EC #</td>
<td>602-051-00-X</td>
</tr>
</tbody>
</table>

March 10, 2000 Validated

### TYPES OF HAZARD/EXPOSURE

#### FIRE

Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.

In case of fire in the surroundings: all extinguishing agents allowed.

#### EXPLOSION

**PREVENT DISPERSION OF DUST!**  
**STRICT HYGIENE!**

IN ALL CASES CONSULT A DOCTOR!

#### EXPOSURE

- **INHALATION**: (See Ingestion).  
  - Local exhaust or breathing protection.
  - Fresh air, rest. Refer for medical attention.

- **SKIN**: MAY BE ABSORBED! (See Ingestion).  
  - Protective gloves. Protective clothing.
  - Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

- **EYES**:  
  - Face shield or eye protection in combination with breathing protection if powder.
  - First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

  - Do not eat, drink, or smoke during work. Wash hands before eating.
  - Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

### SPILLAGE DISPOSAL

Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).

### STORAGE

Separated from food and feedstuffs. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.  
Severe marine pollutant.  
T+ symbol  
N symbol  
R: 24-28-50/53  
S: 1/2-22-36-37-45-60-61  
UN Hazard Class: 6.1  
UN Packing Group: I

### SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

http://www.cdc.gov/niosh/ipcsneng/neng1023.html  
12/9/2011
**ENDRIN**

<table>
<thead>
<tr>
<th><strong>PHYSICAL STATE; APPEARANCE:</strong></th>
</tr>
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<tbody>
<tr>
<td>WHITE CRYSTALS.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PHYSICAL DANGERS:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance decomposes on heating above 245°C, producing hydrogen chloride, phosgene.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CHEMICAL DANGERS:</strong></th>
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</thead>
<tbody>
<tr>
<td>The substance decomposes on heating above 245°C, producing hydrogen chloride, phosgene.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OCCUPATIONAL EXPOSURE LIMITS:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV: 0.1 mg/m³ as TWA; (skin); A4 (not classifiable as a human carcinogen): (ACGIH 2008).</td>
</tr>
<tr>
<td>MAK: 0.1 mg/m³ (Inhalable fraction);</td>
</tr>
<tr>
<td>Peak limitation category: II(8);</td>
</tr>
<tr>
<td>skin absorption (H);</td>
</tr>
<tr>
<td>Pregnancy risk group: C;</td>
</tr>
<tr>
<td>(DFG 2008).</td>
</tr>
<tr>
<td>OSHA PEL: TWA 0.1 mg/m³ skin</td>
</tr>
<tr>
<td>NIOSH REL: TWA 0.1 mg/m³ skin</td>
</tr>
<tr>
<td>NIOSH IDLH: 2 mg/m³ See: 72208</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PHYSICAL PROPERTIES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Decomposes below boiling point at 245°C</td>
</tr>
<tr>
<td>Melting point: 200°C</td>
</tr>
<tr>
<td>Density: 1.7 g/cm³</td>
</tr>
<tr>
<td>Solubility in water, g/100 ml at 25°C: none</td>
</tr>
<tr>
<td>Vapour pressure, Pa at 25°C: negligible</td>
</tr>
<tr>
<td>Octanol/water partition coefficient as log Pow: 5.34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ENVIRONMENTAL DATA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees, birds and mammals. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. In the food chain important to humans, bioaccumulation takes place, specifically in fish and seafood. Avoid release to the environment in circumstances different to normal use.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NOTES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home.</td>
</tr>
<tr>
<td>Transport Emergency Card: TEC (R)-61G41a</td>
</tr>
<tr>
<td>NFPA Code: H3; F0; R; 0</td>
</tr>
<tr>
<td>Card has been partially updated in November 2008: see Occupational Exposure Limits, Storage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ADDITIONAL INFORMATION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ICSC: 1023</td>
</tr>
</tbody>
</table>

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Endrin aldehyde
Product Number: 442578
Brand: Supelco
Product Use: For laboratory research purposes.
Supplier: Sigma-Aldrich
Manufacturer: Sigma-Aldrich Corporation
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (For both supplier and manufacturer) (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion

GHS Classification
Acute toxicity, Oral (Category 4)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning
Hazard statement(s)
H302 Harmful if swallowed.
H413 May cause long lasting harmful effects to aquatic life.
Precautionary statement(s)
none

HMIS Classification
Health hazard: 2
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Molecular Weight : 380.89 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
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</thead>
<tbody>
<tr>
<td>Endrin aldehyde</td>
<td>7421-93-4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form       solid
Colour     no data available

Safety data
pH         no data available
Melting/freezing point   151.0 °C (303.8 °F)
Boiling point  no data available
Flash point     no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit   no data available
Upper explosion limit   no data available
Vapour pressure     no data available
Density           no data available
Water solubility   insoluble
Partition coefficient: n-octanol/water log Pow: 5.60
Relative vapour density no data available
Odour             no data available
Odour Threshold   no data available
Evaporation rate   no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 500.0 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other Information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity
no data available
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation  May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion    Toxic if swallowed.
Skin        May be harmful if absorbed through skin. May cause skin irritation.
Eyes        May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity
no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

no data available

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods
15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endrin aldehyde</td>
<td>7421-93-4</td>
</tr>
</tbody>
</table>

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endrin aldehyde</td>
<td>7421-93-4</td>
<td></td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endrin aldehyde</td>
<td>7421-93-4</td>
<td></td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Endrin ketone
Product Number : 442579
Brand : Supelco
Company : Sigma-Aldrich
            3050 Spruce Street
            SAINT LOUIS MO  63103
            USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Molecular Weight : 41.05 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endrin ketone</td>
<td>53494-70-5</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable Liquid, Highly toxic by ingestion

HMIS Classification
Health Hazard: 3
Flammability: 3
Physical hazards: 0

NFPA Rating
Health Hazard: 3
Fire: 3
Reactivity Hazard: 0

Potential Health Effects

Inhalation : May be harmful if inhaled. May cause respiratory tract irritation.
Skin : May be harmful if absorbed through skin. May cause skin irritation. May be fatal if absorbed through skin.
Eyes : May cause eye irritation.
Ingestion : May be fatal if swallowed.

4. FIRST AID MEASURES
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties
Flash point 2.0 °C (35.6 °F) - closed cup
Ignition temperature 523 °C (973 °F)

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods for cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage

Handle and store under inert gas.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid

Safety data
pH no data available
Melting point -48.0 °C (-54.4 °F)
Boiling point 81.0 - 82.0 °C (177.8 - 179.6 °F)
Flash point 2.0 °C (35.6 °F) - closed cup
Ignition temperature 523 °C (973 °F)
Lower explosion limit 4.4 % (V)
Upper explosion limit 16 % (V)
Vapour pressure 97.1 hPa (72.8 mmHg) at 20.0 °C (68.0 °F)
Density 0.78 g/cm3
Water solubility no data available

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 10.0 mg/kg

Irritation and corrosion
no data available

Sensitisation
no data available

Chronic exposure
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation. May be fatal if absorbed through skin.
Eyes May cause eye irritation.
Ingestion May be fatal if swallowed.

Additional Information
RTECS: PC8600000

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)
no data available

Ecotoxicity effects
Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 1,640.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates. EC50 - Daphnia magna (Water flea) - 3,600.00 mg/l - 48 h

Further information on ecology
no data available

13. DISPOSAL CONSIDERATIONS
14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2810  Class: 6.1  Packing group: II
Proper shipping name: Toxic, liquids, organic, n.o.s. (Endrin ketone)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2810  Class: 6.1  Packing group: II  EMS-No: F-A. S-A
Proper shipping name: TOXIC LIQUID, ORGANIC, N.O.S. (Endrin ketone)
Marine pollutant: No

IATA
UN-Number: 2810  Class: 6.1  Packing group: II
Proper shipping name: Toxic liquid, organic n.o.s. (Endrin ketone)

15. REGULATORY INFORMATION

OSHA Hazards
Flammable Liquid, Highly toxic by ingestion

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

   Endrin ketone
   CAS-No. 53494-70-5

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

   Endrin ketone
   CAS-No. 53494-70-5  Revision Date 1990-01-01

New Jersey Right To Know Components

   Endrin ketone
   CAS-No. 53494-70-5  Revision Date 1990-01-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION
# International Chemical Safety Cards

## LINDANE

### ICSC: 0053

**gamma-1,2,3,4,5,6-Hexachlorocyclohexane**  
**gamma-BHC**  
**gamma-HCH**  

\[ C_6H_6Cl_6 \]

Molecular mass: 290.8

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0053</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>58-89-9</td>
</tr>
<tr>
<td>RTECS #</td>
<td>GV4900000</td>
</tr>
<tr>
<td>UN #</td>
<td>2761</td>
</tr>
<tr>
<td>EC #</td>
<td>602-043-00-6</td>
</tr>
</tbody>
</table>

November 25, 2009 Validated

## TYPES OF HAZARD/EXPOSURE

### ACUTE HAZARDS/SYMPTOMS

### PREVENTION

### FIRST AID/FIRE FIGHTING

**FIRE**

- Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.

- In case of fire in the surroundings: use appropriate extinguishing media.

**EXPLOSION**

- Risk of fire and explosion if formulations contain flammable/explosive solvents.

- In case of fire: keep drums, etc., cool by spraying with water.

### EXPOSURE

- **INHALATION**  
  - Cough. Sore throat. Further see Ingestion.  
  - Avoid inhalation of dust  
  - Fresh air, rest. Refer for medical attention.

- **SKIN**  
  - MAY BE ABSORBED!  
  - Protective gloves. Protective clothing.  
  - Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

- **EYES**  
  - Redness.  
  - Face shield or eye protection in combination with breathing protection.  
  - First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

- **INGESTION**  
  - Do not eat, drink, or smoke during work. Wash hands before eating.  
  - Rinse mouth. Give a slurry of activated charcoal in water to drink, but NOT if convulsions occur. Refer immediately for medical attention.

### SPILLAGE DISPOSAL

- Personal protection: filter respirator for organic gases and particulates adapted to the airborne concentration of the substance, chemical protection suit including self-contained breathing apparatus, protective gloves. Do NOT let this chemical enter the environment. Sweep spilled substance into

### STORAGE

- Well closed. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. Separated from bases, metals, food and feedstuffs.

### PACKAGING & LABELLING

- Do not transport with food and feedstuffs.  
  - Note: C  
  - T symbol  
  - N symbol  
  - R: 20/21-25-48/22-64-50/53  
  - S: 1/2-36/37-45-60-61  
  - UN Hazard Class: 6.1

[http://www.cdc.gov/niosh/ipcsneng/neng0053.html](http://www.cdc.gov/niosh/ipcsneng/neng0053.html)

12/9/2011
**LINDANE**

**ICSC: 0053**

### Physical State: Appearance:
WHITE CRYSTALLINE POWDER.

### Physical Dangers:

### Chemical Dangers:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes including chlorine, hydrogen chloride and phosgene (See ICSCs #0007, #0126 and #0163.) Reacts with bases, producing trichlorobenzene, and with powdered metals.

### Occupational Exposure Limits:

- **OSHA PEL:** TWA 0.5 mg/m³ skin
- **NIOSH REL:** TWA 0.5 mg/m³ skin
- **NIOSH IDLH:** 50 mg/m³ See: [58899](http://monographs.iarc.fr/ENG/Monographs/suppl7/Suppl7-88.pdf)
- **TLV:** 0.5 mg/m³ as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2009).
- **MAK:** 0.1 mg/m³; (Inhalable fraction); Peak limitation category: II(8); skin absorption (H); Carcinogen category: 4; Pregnancy risk group: C; BAT issued; (DFG 2009).

### Physical Properties
- Boiling point: 323°C
- Melting point: 113°C
- Density: 1.9 g/cm³
- Solubility in water, g/100 ml at 20°C: 0.0007 (very poor)
- Vapour pressure, Pa at 20°C: 0.0012
- Relative density of the vapour/air-mixture at 20°C (air = 1): 1
- Octanol/water partition coefficient as log Pow: 3.61-3.72

### Environmental
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain, for example in fish and in seafood. The substance may cause long-term effects in the

---

UN Packing Group: III
Signal: Danger
Skull-Health haz-Enviro
Toxic if swallowed
Toxic in contact with skin
Harmful if inhaled dust
Suspected of causing cancer
May cause harm to breast-fed children
Causes damage to central nervous system
May cause damage to nervous system, bone marrow and liver through prolonged or repeated exposure
Very toxic to aquatic life with long lasting effects

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

---

**ICSC: NENG0053 International Chemical Safety Cards (WHO/IPCS/ILO) | CDC/NIOSH**

---

<table>
<thead>
<tr>
<th>DATA</th>
<th>aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</th>
</tr>
</thead>
</table>

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Do NOT use in the vicinity of a fire or a hot surface, or during welding. See also ICSC #0487 Hexachlorocyclohexane (mixed isomers), #0795 alpha-Hexachlorocyclohexane, #0796 beta-Hexachlorocyclohexane.

**ADDITIONAL INFORMATION**

<table>
<thead>
<tr>
<th>ICSC: 0053</th>
<th>LINDANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
</tr>
</tbody>
</table>

**IMPORTANT LEGAL NOTICE:** Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: GAMMA-CHLORDANE
Product Number: 442599
Brand: Supelco
Company: Sigma-Aldrich
  3050 Spruce Street
  SAINT LOUIS MO  63103
  USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion., Carcinogen

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H351 Suspected of causing cancer.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.

HMIS Classification
Health hazard: 1
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 1
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin Harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula: C10H6Cl8
Molecular Weight : 409.76 g/mol

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans-Chlordane</td>
<td>5103-74-2</td>
<td>225-826-0</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form crystalline
Colour white
Odour odourless

Safety data
pH no data available
Melting point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Density 1.590 g/cm3
Water solubility insoluble

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 1,100 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available
Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
Limited evidence of carcinogenicity in animal studies
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion Harmful if swallowed.
Skin Harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Additional Information

12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to fish LC50 - Lepomis macrochirus - 0.05 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN-Number: 3077  Class: 9  Packing group: III  EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Marine pollutant: Marine pollutant

IATA
UN-Number: 3077  Class: 9  Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s.

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
Harmful by ingestion., Carcinogen

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

trans-Chlordane  CAS-No.  5103-74-2

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

trans-Chlordane  CAS-No.  5103-74-2

New Jersey Right To Know Components

trans-Chlordane  CAS-No.  5103-74-2

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## HEPTACHLOR

**ICSC: 0743**

1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene
1,4,5,6,7,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene
3,4,5,6,8,8a-Heptachlorodicyclopentadiene

C\textsubscript{10}H\textsubscript{5}Cl\textsubscript{7}

Molecular mass: 373.3

**ICSC #** 0743  
**CAS #** 76-44-8  
**RTECS #** PC0700000  
**UN #** 2761  
**EC #** 602-046-00-2  
July 05, 2003 Validated

### TYPES OF HAZARD/EXPOSURE  

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPLOSION

| INHALATION | CONVULSIONS. TERROR. | Local exhausted or breathing protection. | Fresh air, rest. Refer for medical attention. |
| SKIN | MAY BE ABSORBED! (See Inhalation). | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. |
| EYES | Safety goggles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |
| INGESTION | (See Inhalation). | Do not eat, drink, or smoke during work. Wash hands before eating. | Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention. |

### SPILLAGE DISPOSAL

Personal protection: Chemical protection suit including self-contained breathing apparatus. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

Provision to contain effluent from fire extinguishing. Separated from strong oxidants, metals, food and feedstuffs. Well closed. Keep in a well-ventilated room. Dry. Store in an area without drain or sewer access.


### SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

http://www.cdc.gov/niOSH/icpsneng/neng0743.html

11/29/2011
HEPTACHLOR

PHYSICAL STATE; APPEARANCE:
WHITE CRYSTALS OR TAN WAXY SOLID, WITH CHARACTERISTIC ODOR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on heating above 160°C producing toxic fumes including hydrogen chloride. Reacts with strong oxidants. Attacks metal.

OCCUPATIONAL EXPOSURE LIMITS:

TLV: 0.05 mg/m³ as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).

MAK: 0.05 mg/m³ (Inhalable fraction);
Peak limitation category: II(8);
skin absorption (H);
Carcinogen category: 4; Pregnancy risk group: D (DFG 2008).

OSHA PEL: TWA 0.5 mg/m³ skin
NIOSH REL: Ca TWA 0.5 mg/m³ skin See Appendix A
NIOSH IDLH: Ca 35 mg/m³ See: 76448

PHYSICAL PROPERTIES
Decomposes below boiling point at 160°C
Melting point: 95-96°C
Density: 1.6 g/cm³
Solubility in water: none
Vapour pressure, Pa at 25°C: 0.053
Octanol/water partition coefficient as log Pow: 5.27-5.44

ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain, for example in fish and in milk. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

NOTES
Other melting points: 46-74°C for the technical product. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Depending on the degree of exposure, periodic medical examination is suggested.

Transport Emergency Card: TEC (R)-61GT7-II
Card has been partially updated in October 2005: see Occupational Exposure Limits, Emergency Response.
Card has been partially updated in April 2010: see Occupational Exposure Limits, Storage.

ADDITIONAL INFORMATION

ICSC: 0743
(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

http://www.cdc.gov/niosh/ipcsngen/neng0743.html
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Heptachlor epoxide
Product Number: 49042
Brand: Supelco
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Highly toxic by ingestion, Carcinogen

Target Organs
Central nervous system, Liver, Blood

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H300 Fatal if swallowed.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash hands thoroughly after handling.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 3
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 3
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Heptachlor exo-epoxide
HCE
exo-1,4,5,6,7,8,8-Heptachloro-2,3-epoxy-4,7-methano-3a,4,7,7a-tetrahydroindane

Formula: C_{10}H_{15}Cl_{7}O
Molecular Weight: 389.32 g/mol

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<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
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<tr>
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<td>213-831-0</td>
<td>602-063-00-5</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self-contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature: 2 - 8 °C
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**

<table>
<thead>
<tr>
<th>Form</th>
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**Safety data**

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<th>Value</th>
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<tr>
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</tr>
<tr>
<td>Melting point</td>
<td>157.0 - 161.0 °C (314.6 - 321.8 °F)</td>
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<tr>
<td>Boiling point</td>
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<tr>
<td>Ignition temperature</td>
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</tr>
<tr>
<td>Lower explosion limit</td>
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</tr>
<tr>
<td>Upper explosion limit</td>
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</tr>
<tr>
<td>Water solubility</td>
<td>no data available</td>
</tr>
<tr>
<td>Partition coefficient:</td>
<td>log Pow: 5.40</td>
</tr>
<tr>
<td>n-octanol/water</td>
<td></td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION
Acute toxicity
LD50 Oral - rat - 15.0 mg/kg
LD50 Oral - mouse - 39.0 mg/kg
LD50 Oral - rabbit - 144.0 mg/kg
LD50 Intracerebral - mouse - 8 mg/kg
Remarks: Behavioral: Convulsions or effect on seizure threshold.

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.
Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion May be fatal if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: PB9450000
12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to fish  LC50 - Oncorhynchus mykiss (rainbow trout) - 0.02 mg/l - 96.0 h
Toxicity to daphnia  LC50 - Daphnia magna (Water flea) - 0.24 mg/l - 48 h
and other aquatic invertebrates.

Persistence and degradability
no data available

Bioaccumulative potential
Bioaccumulation  Pimephales promelas (fathead minnow) - 32 d
Bioconcentration factor (BCF): 14,400

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2811  Class: 6.1  Packing group: II
Proper shipping name: Toxic solids, organic, n.o.s. (Heptachlor epoxide)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811  Class: 6.1  Packing group: II  EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Heptachlor epoxide)
Marine pollutant: No

IATA
UN-Number: 2811  Class: 6.1  Packing group: II
Proper shipping name: Toxic solid, organic, n.o.s. (Heptachlor epoxide)

15. REGULATORY INFORMATION

OSHA Hazards
Highly toxic by ingestion, Carcinogen

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Heptachlor epoxide  CAS-No.
1024-57-3
SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
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<td>1024-57-3</td>
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Pennsylvania Right To Know Components

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<th>CAS-No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1024-57-3</td>
<td>1994-04-01</td>
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</tbody>
</table>

New Jersey Right To Know Components

<table>
<thead>
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<th>Revision Date</th>
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</thead>
<tbody>
<tr>
<td>1024-57-3</td>
<td>1994-04-01</td>
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</table>

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

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</table>

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
### METHOXYCHLOR

**ICSC:** 1306

1,1-(2,2,2-Trichloroethylidene)bis(4-methoxybenzene)
1,1,1-Trichloro-2,2-bis(p-methoxyphenyl)ethane
Dimethoxy-DDT

\[ C_{16}H_{15}Cl_3O_2 \]
Molecular mass: 345.7

**ICSC #** 1306  
**CAS #** 72-43-5  
**RTECS #** KJ3675000  
March 26, 1999 Validated  

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames.</td>
<td>Powder, alcohol-resistant foam, water spray, carbon dioxide.</td>
<td></td>
</tr>
</tbody>
</table>

**EXPLOSION**

**EXPOSURE**

| INHALATION | See Ingestion. | Local exhaust or breathing protection. | Fresh air, rest. |
| SKIN | Protective gloves. Protective clothing. | Remove contaminated clothes. Rinse and then wash skin with water and soap. |
| EYES | Safety spectacles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

### SPILLAGE DISPOSAL

Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P2 filter respirator for harmful particles.

### STORAGE

Separated from food and feedstuffs. Well closed. Keep in a well-ventilated room.

### PACKAGING & LABELLING

Do not transport with food and feedstuffs.

---

SEE IMPORTANT INFORMATION ON BACK
METHOXYCHLOR

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO LIGHT YELLOW CRYSTALS, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on heating and on burning producing toxic and corrosive gases including hydrogen chloride (see ICSC 0163). Reacts with oxidants. Attacks some plastics and rubber.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 mg/m³ as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2004).
MAK: (Inhalable fraction) 15 mg/m³; Peak limitation category: II(8); Pregnancy risk group: D; (DFG 2004).
OSHA PEL*: TWA 15 mg/m³
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca 5000 mg/m³ See: 72435

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, kidneys, central nervous system, when ingested in large amounts. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES
Melting point: 89°C
Density: 1.4 g/cm³
Solubility in water: none
Vapour pressure: negligible
Octanol/water partition coefficient as log Pow: 4.68-5.08

ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

NOTES
Temperature of decomposition unknown in literature. Depending on the degree of exposure, periodic medical examination is suggested. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Maralate, Marlante, Metox, Prentox, Methoxide are trade names. See also ICSC0034 for DDT. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

ICSC: 1306

METHOXYCHLOR

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

http://www.cdc.gov/niosh/ipcsneng/neng1306.html
11/29/2011
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 2,4'-DDD
Product Number : 35485
Brand : Fluka
Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Target Organ Effect, Carcinogen

Target Organs
Central nervous system, Adrenal cortex.

GHS Classification
Carcinogenicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning
Hazard statement(s)
H351 Suspected of causing cancer.

Precautionary statement(s)
P281 Use personal protective equipment as required.

HMIS Classification
Health hazard: 0
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms:
Mitotane
0,p'-DDD
1-(2-Chlorophenyl)-1-(4-chlorophenyl)-2,2-dichloroethane
(2,4'-Dichlorodiphenyl)dichloroethane

Formula: \( \text{C}_{14}\text{H}_{10}\text{Cl}_{4} \)
Molecular Weight: 320.04 g/mol

<table>
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4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self-contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
8. EXPOSURE CONTROLS/PERSOAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form crystalline
Colour white

Safety data
pH no data available
Melting point/freezing point Melting point/range: 77 - 78 °C (171 - 172 °F) - lit.
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density no data available
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
Odour: no data available
Odour Threshold: no data available
Evaporation rate: no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents, Strong bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - > 5,000 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.
Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Mitotane)
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or
anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion May be harmful if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Synergistic effects
no data available

Additional Information
RTECS: KH7880000

12. ECOLOGICAL INFORMATION

Toxicity
no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Target Organ Effect, Carcinogen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitotane</td>
<td>53-19-0</td>
<td>2009-07-17</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

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</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
# International Chemical Safety Cards

## PARATHION

**ICSC: 0006**

O,O-Diethyl-O-(4-nitrophenyl)phosphorothioate  
Phosphorothioic acid O,O-diethyl O-(4-nitrophenyl) ester  
Ethyl parathion  
\((\text{C}_2\text{H}_5\text{O})_2\text{PSOC}_6\text{H}_4\text{NO}_2\)  
Molecular mass: 291.3

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire. Liquid formulations containing organic solvents may be flammable.</td>
<td>NO open flames.</td>
<td>Water spray, dry powder, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! (Further see Inhalation).</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td>MAY BE ABSORBED! Redness. Pain. Blurred vision.</td>
<td>Face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Abdominal cramps. Diarrhoea. Vomiting. (Further see Inhalation).</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td>Give a slurry of activated charcoal in water to drink. Refer for medical attention. See Notes.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL
Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Treat remaining liquid with an alkaline substance. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this

### STORAGE
Provision to contain effluent from fire extinguishing. Separated from strong oxidants, food and feedstuffs. Well closed. Keep in a well-ventilated room.

### PACKAGING & LABELLING
Do not transport with food and feedstuffs. Severe marine pollutant.  
T+ symbol  
N symbol  
R: 24-26/28-48/25-50/53  
S: 1/2-28-36/37-45-60-61
PARATHION

**ICSC: 0006**

**PHYSICAL STATE; APPEARANCE:**
PALE YELLOW TO BROWN (TECHNICAL PRODUCT) LIQUID, WITH CHARACTERISTIC ODOUR.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
The substance decomposes on heating above 200°C, producing toxic gases including carbon monoxide, nitrogen oxides, phosphorous oxides and sulfur oxides. Reacts with strong oxidants. Attacks some forms of plastics, rubber and coatings.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: (I,V) 0.05 mg/m³; A4; BEI issued; (skin); (ACGIH 2004).

MAK: (I) 0.1 mg/m³; H; Peak limitation category: II (8); Pregnancy risk group: D; (DFG 2003).

OSHA PEL: TWA 0.1 mg/m³ skin

NIOSH REL: TWA 0.05 mg/m³ skin

NIOSH IDLH: 10 mg/m³ See: 56382

**PHYSICAL PROPERTIES**
- Boiling point: 375°C
- Melting point: 6°C
- Relative density (water = 1): 1.26
- Solubility in water, g/100 ml at 25°C: 0.002
- Flash point: 120°C
- Octanol/water partition coefficient as log Pow: 3.8

**ENVIRONMENTAL DATA**
The substance is very toxic to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to birds. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.

**NOTES**
Depending on the degree of exposure, periodic medical examination is indicated. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-61GT6-I

http://www.cdc.gov/niosh/ipcsneng/neng0006.html

12/9/2011
IMPORTANT LEGAL NOTICE:

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**CAMPHECHLOR**

Toxaphene
Chlorinated camphene (60%)
Polychlorocamphene
$C_{10}H_{10}Cl_8$ (approx.)

Molecular mass: 413.8 (average)

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMBOLS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>Foam, powder, carbon dioxide. NO water.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water but NO direct contact with water.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>The explosion hazard will depend on the solvent used in the formulation.</td>
<td>STRICT HYGIENE!</td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td>INHALATION</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td>SKIN</td>
<td>MAY BE ABSORBED! Redness.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness.</td>
<td>Safety goggles, or face shield.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Do NOT wash away into sewer. Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place.

**STORAGE**

Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Keep in the dark.

**PACKAGING & LABELLING**

Do not transport with food and feedstuffs. Marine pollutant.
T symbol
N symbol
R: 21-25-37/38-40-50/53
S: 1/2-36/37-45-60-61
UN Hazard Class: 6.1

SEE IMPORTANT INFORMATION ON BACK
# International Chemical Safety Cards

## CAMPHECHLOR

### PHYSICAL STATE; APPEARANCE:
YELLOW TO AMBER WAXY SOLID, WITH CHARACTERISTIC ODOUR.

### PHYSICAL DANGERS:

### CHEMICAL DANGERS:
The substance decomposes on heating, on burning and/or under influence of alkali, strong sunlight, and catalysts like iron producing toxic fumes. Attacks iron. Incompatible with strongly alkaline pesticides.

### OCCUPATIONAL EXPOSURE LIMITS:

- **TLV:** 0.5 mg/m³ as TWA; 1 mg/m³ as STEL; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2008).
- **MAK:** skin absorption (H); Carcinogen category: 2 (DFG 2008).
- **OSHA PEL†:** TWA 0.5 mg/m³ skin
- **NIOSH REL:** Ca skin See Appendix A
- **NIOSH IDLH:** Ca 200 mg/m³ See: 8001352

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body through the skin, by ingestion.

### INHALATION RISK:

### EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates mildly the skin. The substance may cause effects on the central nervous system, resulting in tremors and convulsions. Exposure at high level may result in death.

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES
- Melting point: 65-90°C
- Relative density (water = 1): 1.65
- Solubility in water: None
- Vapour pressure, Pa at 25°C: 53
- Relative vapour density (air = 1): 14.3
- Octanol/water partition coefficient as log Pow: 3.3

### ENVIRONMENTAL DATA
This substance may be hazardous to the environment; special attention should be given to water organisms, some terrestrial species, and birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic species.

### NOTES
Decomposes near boiling point. Camphechlor is a reaction mixture of chlorinated camphenes containing 67-69% chlorine. Use of this organochlorine pesticide should be discouraged, except where there is no adequate alternative. Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alltox, Chem-Phene, M 5055, Clor Chem T-590, Crestoxo, Estonox, Fasco-Terpene, Geniphene, Gy-phene, Hercules 3956, Melipex, Phenephene, Phenacide, Phenatox, Strobane-T, Toxakil, Toxyphene, Toxon 63 are trade names.

Transport Emergency Card: TEC (R)-61G53b

Card has been partially updated in November 2008: see Occupational Exposure Limits, EU Classification, Packaging & labelling.

## ADDITIONAL INFORMATION

ICSC: 0843

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**
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[View on CDC/NIOSH website](http://www.cdc.gov/niosh/ipcsneng/neng0843.html)
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Aroclor 1016
Product Number: 48591
Brand: Supelco
Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer): (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

GHS Classification
Acute toxicity, Oral (Category 5)
Specific target organ toxicity - repeated exposure (Category 2)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning
Hazard statement(s)
H303 May be harmful if swallowed.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 1
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: U
Reactivity Hazard: 0
Potential Health Effects

Inhalation
May be harmful if inhaled. May cause respiratory tract irritation.

Skin
May be harmful if absorbed through skin. May cause skin irritation.

Eyes
May cause eye irritation.

Ingestion
May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroclor 1016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12674-11-2</td>
<td>-</td>
<td>602-039-00-4</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour no data available

Safety data
pH no data available
Melting point/freezing point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density no data available
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
Odour no data available
Odour Threshold no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. Nature of decomposition products not known.
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 2,300 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Reproductive toxicity - rat - Oral
Effects on Newborn: Biochemical and metabolic.
Reproductive toxicity - Monkey - Oral
Effects on Newborn: Behavioral.
Reproductive toxicity - Mammal - Oral
Effects on Fertility: Other measures of fertility Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

no data available

**Teratogenicity**
Developmental Toxicity - rat - Oral
Specific Developmental Abnormalities: Central nervous system.

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
May cause damage to organs through prolonged or repeated exposure.

**Aspiration hazard**
no data available

**Potential health effects**
- **Inhalation**: May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion**: May be harmful if swallowed.
- **Skin**: May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes**: May cause eye irritation.

**Synergistic effects**
no data available

**Additional Information**
RTECS: Not available

12. **ECOLOGICAL INFORMATION**

**Toxicity**
Toxicity to fish: LC50 - Oncorhynchus mykiss (rainbow trout) - 0.0010 mg/l - 96.0 h

**Persistence and degradability**
- **Biodegradability**: Biotic/Aerobic Biochemical oxygen demand

**Bioaccumulative potential**
- **Bioaccumulation**: Pimephales promelas (fathead minnow) - Bioconcentration factor (BChl): 42,500

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. **DISPOSAL CONSIDERATIONS**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.
14. TRANSPORT INFORMATION

DOT (US)
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2315  Class: 9  Packing group: II  EMS-No: F-A, S-A
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID
Marine pollutant: No

IATA
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Aroclor 1016</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
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<tbody>
<tr>
<td>12674-11-2</td>
<td>1993-04-24</td>
<td></td>
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</tbody>
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Pennsylvania Right To Know Components

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<tr>
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<td>1993-04-24</td>
<td></td>
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New Jersey Right To Know Components

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<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>12674-11-2</td>
<td>2003-01-24</td>
<td></td>
</tr>
</tbody>
</table>

California Prop. 65 Components

<table>
<thead>
<tr>
<th>WARNING! This product contains a chemical known to the State of California to cause cancer.</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroclor 1016</td>
<td>12674-11-2</td>
<td>2008-08-01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroclor 1016</td>
<td>12674-11-2</td>
<td>2008-08-01</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Aroclor 1221
Product Number: 48587
Brand: Supelco
Supplier: Sigma-Aldrich Corporation
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Target Organ Effect

Target Organs
Nerves. Nerves.

GHS Classification
Specific target organ toxicity - repeated exposure (Category 2)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning
Hazard statement(s)
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 0
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS-No.</th>
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<tr>
<td>PCB - Aroclor 1221</td>
<td></td>
<td>602-039-00-4</td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

---

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
- **Form**: liquid
- **Colour**: no data available

**Safety data**
- **pH**: no data available
- **Melting point/freeze point**: no data available
- **Boiling point**: no data available
- **Flash point**: no data available
- **Ignition temperature**: no data available
- **Autoignition temperature**: no data available
- **Lower explosion limit**: no data available
- **Upper explosion limit**: no data available
- **Vapour pressure**: no data available
- **Density**: no data available
- **Water solubility**: no data available
- **Partition coefficient: n-octanol/water**: no data available
- **Relative vapour density**: no data available
10. STABILITY AND REACTIVITY

**Chemical stability**
Stable under recommended storage conditions.

**Possibility of hazardous reactions**
no data available

**Conditions to avoid**
no data available

**Materials to avoid**
Strong oxidizing agents

**Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known. Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

**Oral LD50**
LD50 Oral - rat - 3,980 mg/kg

**Inhalation LC50**
**Dermal LD50**
no data available

**Other information on acute toxicity**
no data available

**Skin corrosion/irritation**

**Serious eye damage/eye irritation**

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**
no data available

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

Reproductive toxicity - rabbit - Oral
Effects on Newborn: Biochemical and metabolic.
Reproductive toxicity - rat - Subcutaneous
Maternal Effects: Uterus, cervix, vagina.
Reproductive toxicity - rat - Subcutaneous
Effects on Fertility: Other measures of fertility
no data available

Teratogenicity

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
May cause damage to organs through prolonged or repeated exposure.
no data available

Aspiration hazard
no data available

**Potential health effects**

- **Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion** May be harmful if swallowed.
- **Skin** May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes** May cause eye irritation.

**Signs and Symptoms of Exposure**
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**
no data available

**Additional Information**
RTECS: Not available

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**

- **Toxicity to fish** LC50 - Oncorhynchus clarki - 1.17 mg/l - 96.0 h

**Persistence and degradability**

- **Biodegradability** Biotic/Aerobic Biochemical oxygen demand
  Result: 100 % - Readily biodegradable.

**Bioaccumulative potential**
no data available

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.
no data available

---

**13. DISPOSAL CONSIDERATIONS**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**
DOT (US)
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid
Reportable Quantity (R.Q): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID
Marine pollutant: No

IATA
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid

15. REGULATORY INFORMATION

OSHA Hazards
Target Organ Effect

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>PCB - Aroclor 1221</th>
<th>CAS-No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11104-28-2</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

<table>
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New Jersey Right To Know Components

<table>
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</tr>
</tbody>
</table>

California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
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<th>PCB - Aroclor 1221</th>
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<tbody>
<tr>
<td></td>
<td>11104-28-2</td>
<td>2008-08-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

<table>
<thead>
<tr>
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16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Aroclor 1232
Product Number: 48588
Brand: Supelco
Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

GHS Classification
Acute toxicity, Oral (Category 5)
Acute aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning

Hazard statement(s)
H303 May be harmful if swallowed.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.

HMIS Classification
Health hazard: 1
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
Eyes: May cause eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

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<td>11141-16-5</td>
<td>602-039-00-4</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour no data available

Safety data
pH no data available
Melting point/freezing point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density no data available
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
Odour no data available
Odour Threshold no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under certain conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 4,470 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity
no data available
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
Ingestion - May cause damage to organs through prolonged or repeated exposure. - Skin

Aspiration hazard
no data available

Potential health effects

| Inhalation | May be harmful if inhaled. May cause respiratory tract irritation. |
| Ingestion  | May be harmful if swallowed.                                      |
| Skin       | May be harmful if absorbed through skin. May cause skin irritation. |
| Eyes       | May cause eye irritation.                                         |

Signs and Symptoms of Exposure
chloracne, hair loss, hyperpigmentation, Liver injury may occur, May cause endocrine disruption.

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

| Toxicity to fish | LC50 - Onchorhynchus clarki - 1.72 mg/l - 96.0 h |
| Toxicity to algae| Growth inhibition EC50 - Thalassiosira rotula - 0.071 mg/l - 44 h |

Persistence and degradability

| Biodegradability | Biotic/Aerobic |
|                  | Result: 100 % - Readily biodegradable. |

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2315   Class: 9   Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No
IMDG
UN number: 2315   Class: 9   Packing group: II   EMS-No: F-A, S-A
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID
Marine pollutant: No

IATA
UN number: 2315   Class: 9   Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid

15. REGULATORY INFORMATION

OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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<td>1993-04-24</td>
</tr>
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</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Supeico - 48588

Page 6 of 6
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1242
Product Number : 48585
Brand : Supelco
Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

GHS Classification
Acute toxicity, Oral (Category 5)
Specific target organ toxicity - repeated exposure (Category 1)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word
Danger

Hazard statement(s)
H303 May be harmful if swallowed.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P314 Get medical advice/attention if you feel unwell.
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 1
Flammability: 0
Physical hazard: 0

NFPA Rating
Health hazard: U
Fire: 0
Reactivity Hazard: 0
Potential Health Effects

**Inhalation**: May be harmful if inhaled. May cause respiratory tract irritation.

**Skin**: May be harmful if absorbed through skin. May cause skin irritation.

**Eyes**: May cause eye irritation.

**Ingestion**: May be harmful if swallowed.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
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<td>53469-21-9</td>
<td>602-039-00-4</td>
<td>-</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 5. FIRE-FIGHTING MEASURES

**Conditions of flammability**
Not flammable or combustible.

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

### 7. HANDLING AND STORAGE

**Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

**Conditions for safe storage**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroclor 1242</td>
<td>53469-21-9</td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks
Eye irritation Liver damage Chloracne Danger of cutaneous absorption

<table>
<thead>
<tr>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>1 mg/m³</td>
<td>USA, Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td>Skin designation</td>
<td>USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
</tr>
<tr>
<td>TWA</td>
<td>1 mg/m³</td>
<td>USA, NIOSH Recommended Exposure Limits</td>
</tr>
</tbody>
</table>

Potential Occupational Carcinogen See Appendix A

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour no data available

Safety data
pH no data available
Melting point/freezing point no data available
Boiling point no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 4,250 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Chromodacryorrhea. Diarrhoea
Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization

Germ cell mutagenicity

Supeico - 48585
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)

Causes damage to organs through prolonged or repeated exposure.

no data available

Aspiration hazard

no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Ingestion May be harmful if swallowed.

Skin May be harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects

no data available

Additional Information

RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 0.015 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates. LC50 - Daphnia magna (Water flea) - 0.23 mg/l - 48 h

Toxicity to algae LC50 - Algae - 0.006 mg/l - 28 h

Persistence and degradability

Biodegradability Result: According to the results of tests of biodegradability this product is not readily biodegradable.

Remarks: no data available

Bioaccumulative potential
Bioaccumulation
Pimephales promelas (fathead minnow) - 8.5 Months
Bioconcentration factor (BCF): 274,000

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION
DOT (US)
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1242)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No

IMDG
UN number: 2315  Class: 9  Packing group: II  EMS-No: F-A, S-A
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID (Aroclor 1242)
Marine pollutant: No

IATA
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1242)

15. REGULATORY INFORMATION
OSHA Hazards
No known OSHA hazards

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

Aroclor 1242  CAS-No.  53469-21-9  Revision Date  1993-04-24

Pennsylvania Right To Know Components

Aroclor 1242  CAS-No.  53469-21-9  Revision Date  1993-04-24

New Jersey Right To Know Components

Aroclor 1242  CAS-No.  53469-21-9  Revision Date  1993-04-24
California Prop. 65 Components
WARNING! This product contains a chemical known to the State of
California to cause cancer.
Aroclor 1242

Aroclor 1242

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1248

Product Number : 48589
Brand : Supelco
Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich
Manufacturer : Sigma-Aldrich Corporation
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Target Organ Effect

Target Organs
Liver

GHS Classification
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment
P501 Dispose of contents/container to an approved waste disposal plant.

HMIS Classification
Health hazard: 0
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0
Potential Health Effects

Inhalation  May be harmful if inhaled. May cause respiratory tract irritation.

Skin  May be harmful if absorbed through skin. May cause skin irritation.

Eyes  May cause eye irritation.

Ingestion  May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroclor 1248</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12672-29-6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**
Respiratory protection not required. For nuisance exposures use type OV/AG (US) or type ABEK (EU EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**
Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th><strong>Appearance</strong></th>
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</thead>
<tbody>
<tr>
<td>Form</td>
<td>liquid</td>
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<tr>
<td>Colour</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Safety data</strong></th>
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</thead>
<tbody>
<tr>
<td>pH</td>
</tr>
<tr>
<td>Melting/freezing point</td>
</tr>
<tr>
<td>Boiling point</td>
</tr>
<tr>
<td>Flash point</td>
</tr>
<tr>
<td>Ignition temperature</td>
</tr>
<tr>
<td>Autoignition temperature</td>
</tr>
<tr>
<td>Lower explosion limit</td>
</tr>
<tr>
<td>Upper explosion limit</td>
</tr>
<tr>
<td>Vapour pressure</td>
</tr>
<tr>
<td>Density</td>
</tr>
<tr>
<td>Water solubility</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
</tr>
<tr>
<td>Relative vapour density</td>
</tr>
<tr>
<td>Odour</td>
</tr>
<tr>
<td>Odour Threshold</td>
</tr>
<tr>
<td>Evaporation rate</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known. Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 11,000 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other Information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Reproductive toxicity - Monkey - Oral
Maternal Effects: Menstrual cycle changes or disorders.
Reproductive toxicity - Monkey - Oral
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Reproductive toxicity - Monkey - Oral
Effects on Fertility: Abortion.
Reproductive toxicity - Monkey - Oral
Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Behavioral. Effects on Newborn: Other postnatal measures or effects.

no data available

**Teratogenicity**

Developmental Toxicity - rabbit - Oral
Specific Developmental Abnormalities: Immune and reticuloendothelial system.

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

| Inhalation | May be harmful if inhaled. May cause respiratory tract irritation. |
| Ingestion  | May be harmful if swallowed. |
| Skin       | May be harmful if absorbed through skin. May cause skin irritation. |
| Eyes       | May cause eye irritation. |

**Signs and Symptoms of Exposure**
Nausea, Dizziness, Headache, muscle pain, muscle weakness, neck stiffness, trunk stiffness, stiffness of extremities, thick feeling in the tongue, Thirst

**Synergistic effects**
no data available

**Additional Information**
RTECS: Not available

---

12. ECOLOGICAL INFORMATION

**Toxicity**

| Toxicity to fish | LC50 - Lepomis macrochirus - 0.278 mg/l - 96.0 h |
| Toxicity to algae | Growth inhibition EC50 Thalassiosira rotula 0.02 mg/l 44 h |

**Persistence and degradability**
no data available

**Bioaccumulative potential**

| Bioaccumulation | Pimephales promelas (fathead minnow) - 250 d |
| Digestion factor (DOF) | 120,000 |

**Mobility in soil**
no data available

**PBT and vPvB assessment**
no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

no data available

---

13. DISPOSAL CONSIDERATIONS
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1248)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2315  Class: 9  Packing group: II  EMS-No: F-A, S-A
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID (Aroclor 1248)
Marine pollutant: Marine pollutant

IATA
UN-Number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1248)

15. REGULATORY INFORMATION

OSHA Hazards
Target Organ Effect

USL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Aroclor 1248
CAS-No. 12672-29-6

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

Aroclor 1248
CAS-No. 12672-29-6  Revision Date 1993-04-24

Pennsylvania Right To Know Components

Aroclor 1248
CAS-No. 12672-29-6  Revision Date 1993-04-24

New Jersey Right To Know Components

Aroclor 1248
CAS-No. 12672-29-6  Revision Date 1993-04-24

California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause cancer.
Aroclor 1248
CAS-No. 12672-29-6  Revision Date 2008-08-01

California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Aroclor 1248
CAS-No. 12672-29-6  Revision Date 2008-08-01
16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
Chlorobiphenyl (54% chlorine)
Chlorodiphenyl (54% chlorine)
PCB

Molecular mass: 327 (average)

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0939</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>11097-69-1</td>
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<tr>
<td>RTECS #</td>
<td>TQ1360000</td>
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<td>UN #</td>
<td>2315</td>
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<tr>
<td>EC #</td>
<td>602-039-00-4</td>
</tr>
</tbody>
</table>

October 20, 1999 Peer reviewed

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: powder, carbon dioxide.</td>
</tr>
</tbody>
</table>

### EXPLOSION

PREVENT GENERATION OF MISTS! STRICT HYGIENE!

### EXPOSURE

<table>
<thead>
<tr>
<th>INHALATION</th>
<th>VENTILATION.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKIN</td>
<td>MAY BE ABSORBED! Dry skin. Redness.</td>
</tr>
<tr>
<td>EYES</td>
<td>Safety goggles, face shield.</td>
</tr>
</tbody>
</table>

### FIRST AID/FIRE FIGHTING

<table>
<thead>
<tr>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>In case of fire in the surroundings: powder, carbon dioxide.</td>
</tr>
<tr>
<td>PREVENT GENERATION OF MISTS! STRICT HYGIENE!</td>
</tr>
<tr>
<td>VENTILATION.</td>
</tr>
<tr>
<td>MAY BE ABSORBED! Dry skin. Redness.</td>
</tr>
<tr>
<td>Safety goggles, face shield.</td>
</tr>
<tr>
<td>Headache. Numbness.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

### STORAGE


### PACKAGING & LABELLING

Unbreakable packaging: put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.

Severe marine pollutant.

Note: C

Xn symbol

N symbol

R: 33-50/53

S: 2-35-60-61

UN Hazard Class: 9

UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0939

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**POLYCHLORINATED BIPHENYL (AROCLOR 1254)**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>LIGHT YELLOW VISCOUS LIQUID.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>The substance decomposes in a fire producing irritating and toxic gases.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV: 0.5 mg/m³ as TWA; (skin): A3; (ACGIH 2004).</td>
</tr>
<tr>
<td></td>
<td>MAK: 0.05 ppm, 0.70 mg/m³; H;</td>
</tr>
<tr>
<td></td>
<td>Peak limitation category: II(8); Carcinogen category: 3B; Pregnancy risk group: B; (DFG 2004).</td>
</tr>
<tr>
<td></td>
<td>OSHA PEL: TWA 0.5 mg/m³ skin</td>
</tr>
<tr>
<td></td>
<td>NIOSH REL*: Ca TWA 0.001 mg/m³ See Appendix A *Note: The REL also applies to other PCBs.</td>
</tr>
<tr>
<td></td>
<td>NIOSH IDLH: Ca 5 mg/m³ See: IDLH INDEX</td>
</tr>
<tr>
<td>PHYSICAL PROPERTIES</td>
<td>Relative density (water = 1): 1.5</td>
</tr>
<tr>
<td></td>
<td>Solubility in water: none</td>
</tr>
<tr>
<td>ENVIRONMENTAL DATA</td>
<td>In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment.</td>
</tr>
<tr>
<td>NOTES</td>
<td>Changes into a resinous state (pour point) at 10°C. Distillation range: 365°C-390°C. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response. Transport Emergency Card: TEC (R)-90GM2-II-L</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION</td>
<td></td>
</tr>
<tr>
<td>ICSC: 0939 POLYCHLORINATED BIPHENYL (AROCLOR 1254)</td>
<td>(C) IPCS, CEC, 1994</td>
</tr>
<tr>
<td>IMPORTANT LEGAL NOTICE:</td>
<td>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</td>
</tr>
</tbody>
</table>
1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Aroclor 1262
Product Number: 442463
Brand: Supelco
Supplier: Sigma-Aldrich
   3050 Spruce Street
   SAINT LOUIS MO 63103
   USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer): (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
   Product Safety - Americas Region
   1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen

GHS Classification
Carcinogenicity (Category 1B)
Specific target organ toxicity - repeated exposure (Category 2)
Acute aquatic toxicity (Category 3)
Chronic aquatic toxicity (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H350 May cause cancer.
H373 May cause damage to organs through prolonged or repeated exposure.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P273 Avoid release to the environment.
P308 + P313 IF exposed or concerned: Get medical advice/attention.

HMIS Classification
Health hazard: 0
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health hazard: 0
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation  May be harmful if inhaled. May cause respiratory tract irritation.
Skin       May be harmful if absorbed through skin. May cause skin irritation.
Eyes       May cause eye irritation.
Ingestion  May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Concentration</th>
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</thead>
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<tr>
<td>PCB - Aroclor 1262</td>
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<td>602-039-00-4</td>
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</tr>
<tr>
<td>37324-23-5</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

   General advice
   Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

   If inhaled
   If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

   In case of skin contact
   Wash off with soap and plenty of water. Consult a physician.

   In case of eye contact
   Flush eyes with water as a precaution.

   If swallowed
   Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

   Conditions of flammability
   Not flammable or combustible.

   Suitable extinguishing media
   Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

   Special protective equipment for fire-fighters
   Wear self contained breathing apparatus for fire fighting if necessary.

   Hazardous combustion products
   Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

6. ACCIDENTAL RELEASE MEASURES

   Personal precautions
   Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

   Environmental precautions
   Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

   Methods and materials for containment and cleaning up
   Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

   Precautions for safe handling
   Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSOMAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Form liquid
Colour no data available

Safety data
pH no data available
Melting point/freezing point no data available
Boiling point no data available
Flash point no data available
Ignition temperature no data available
Autoignition temperature no data available
Lower explosion limit no data available
Upper explosion limit no data available
Vapour pressure no data available
Density no data available
Water solubility no data available
Partition coefficient: n-octanol/water no data available
Relative vapour density no data available
10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known. Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 11,300 mg/kg

Inhalation LC50
no data available

Dermal LD50
Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Carcinogen

Possible human carcinogen

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
May cause damage to organs through prolonged or repeated exposure.
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion May be harmful if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: TQ1364000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish LC50 - Oncorhynchus clarki - 50 mg/l - 96 h

Persistence and degradability

Biodegradability Result: - According to the results of tests of biodegradability this product is not readily biodegradable.
Remarks: no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life with long lasting effects.
13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid
Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID
Marine pollutant: No

IATA
UN number: 2315  Class: 9  Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minims) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

PCB - Aroclor 1262
CAS-No. 37324-23-5  Revision Date 1989-08-11

New Jersey Right To Know Components

PCB - Aroclor 1262
CAS-No. 37324-23-5  Revision Date 1989-08-11

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.
PCB - Aroclor 1262
CAS-No. 37324-23-5  Revision Date 2008-08-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
PCD - Aroclor 1262
CAS-No. 37324-23-5  Revision Date 2008-08-01

Supeico - 442463
16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a
guide. The information in this document is based on the present state of our knowledge and is applicable to the
product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the
product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the
above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
ALUMINIUM OXIDE

alpha-Aluminum oxide
Alumina
Aluminum trioxide
Al₂O₃
Molecular mass: 101.9

ICSC # 0351
CAS # 1344-28-1
RTECS # BD1200000
February 10, 2000 Validated

TYPES OF HAZARD/EXPOSURE

ACUTE HAZARDS/SYMPTOMS

PREVENTION

FIRST AID/FIRE FIGHTING

FIRE
Not combustible.

In case of fire in the surroundings: all extinguishing agents allowed.

EXPLOSION

EXPOSURE

PREVENT DISPERSION OF DUST!

• INHALATION Cough.

Local exhaust or breathing protection.

Fresh air, rest.

• SKIN

Protective gloves.

Rinse and then wash skin with water and soap.

• EYES

Redness.

Safety goggles, or eye protection in combination with breathing protection.

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

• INGESTION

Do not eat, drink, or smoke during work.

Rinse mouth.

SPILLAGE DISPOSAL

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Wash away remainder with plenty of water. (Extra personal protection: P1 filter respirator for inert particles).

STORAGE

PACKAGING & LABELLING

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ALUMINIUM OXIDE

PHYSICAL STATE; APPEARANCE:
WHITE POWDER.

PHYSICAL DANGERS:

ROUTE OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol.

http://www.cdc.gov/niosh/ipcsneng/neng0351.html
CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 mg/m³ (as TWA) A4, for particulate matter containing no asbestos and < 1% crystalline silica (ACGIH 2000).
MAK: 1.5 mg/m³ (Respirable fraction) 4 mg/m³ (Inhalable fraction)
Pregnancy risk group: D

OSHA PEL†: TWA 15 mg/m³ (total) TWA 5 mg/m³ (resp)
NIOSH REL: See Appendix D
NIOSH IDLH: N.D. See: IDLH INDEX

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of high concentrations of dusts of this substance may cause eyes and upper respiratory tract irritation.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system.

PHYSICAL PROPERTIES
Boiling point: 3000°C
Melting point: 2054°C
Density: 3.97 g/cm³
Solubility in water: none

ENVIRONMENTAL DATA

NOTES
There is a different and hard crystalline form of aluminium oxide which occurs abundantly in nature under the name corundum (CAS 1302-74-5). Other melting points: 2015°C (approx.) (corundum). Occurs also as the minerals: bauxite, bayerite, boehmite, diaspore, gibbsite. Card has been partly updated in October 2006. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

ICSC: 0351
ALUMINIUM OXIDE
(C) IPCS, CEC, 1994

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Antimony ICSC: 0775

**Antimony black**
**Antimony regulus**
**Stibium**
**Sb**

Atomic mass: 121.8

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with oxidants, halogens, acid(s).</td>
<td>water spray, foam, powder, carbon dioxide</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Finely dispersed particles form explosive mixtures in air. Risk of fire and explosion on contact with .</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
</tbody>
</table>

**EXPOSURE**

- **INHALATION** Cough. (See Ingestion). Local exhaust or breathing protection. Fresh air, rest.
- **SKIN** Protective gloves. Remove contaminated clothes. Rinse and then wash skin with water and soap.
- **EYES** Redness. Pain. Safety goggles, or eye protection in combination with breathing protection if powder. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
- **INGESTION** Abdominal pain. Vomiting. Diarrhoea. Do not eat, drink, or smoke during work. Rinse mouth. Refer for medical attention if you feel unwell.

**SPILLAGE DISPOSAL**

Personal protection: P2 filter respirator for harmful particles. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting.

**STORAGE**

Separated from oxidants, acids, halogens, food and feedstuffs.

**PACKAGING & LABELLING**

Do not transport with food and feedstuffs. UN Hazard Class: 6.1 UN Packing Group: III

---

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL STATE; APPEARANCE:**
Silver-white, lustrous, hard, brittle lumps or dark gray powder

**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
On combustion, forms toxic fumes (antimony oxides; see ICSC 0012). Reacts violently with oxidants, causing fire and explosion hazard. On contact with acids may emit toxic gas (stibine; see ICSC 0776).

**PHYSICAL PROPERTIES**
- Boiling point: 1635 °C
- Melting point: 630 °C
- Density: 6.7 g/cm³

**Solubility in water:** none

**ENVIRONMENTAL DATA**
Other boiling points: 1325°C, 1440°C, 1587 °C, 1750°C. The recommendations on this card apply only to metallic antimony. See ICSC 0012 antimony trioxide, ICSC 1224 antimony trichloride, ICSC 0220 antimony pentafluoride and ICSC 0776 antimony trihydride.

**NOTES**
Transport Emergency Card: TEC (R)-61GT5-III

**ADDITIONAL INFORMATION**

**ICSC: 0775**
(C) IPCS, CEC, 1994

**ANTIMONY**

**IMPORTANT LEGAL NOTICE:**
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http://www.cdc.gov/niosh/ipcsneng/neng0775.html
### ACUTE HAZARDS/SYMPTOMS

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!</td>
<td></td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td>• SKIN</td>
<td>Redness.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Redness.</td>
<td>Face shield or eye protection in combination with breathing protection if powder.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.

### STORAGE
Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.

### PACKAGING & LABELLING
Do not transport with food and feedstuffs. Marine pollutant.

- T symbol
- N symbol
- R: 23/25-50/53
- S: 1/2-20/21-28-45-60-61
- UN Hazard Class: 6.1
- UN Packing Group: II

---

Grey arsenic

As

Atomic mass: 74.9

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PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.01 mg/m³ as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).
OSHA PEL: 1910.1018 TWA 0.010 mg/m³
NIOSH REL: Ca C 0.002 mg/m³ 15-minute See Appendix A
NIOSH IDLH: Ca 5 mg/m³ (as As) See: 7440382

PHYSICAL PROPERTIES
Sublimation point: 613°C
Density: 5.7 g/cm³
Solubility in water: none

ENVIRONMENTAL DATA
The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

NOTES
The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).

Transport Emergency Card: TEC (R)-61GT5-II

ADDITIONAL INFORMATION

ICSC: 0013
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# International Chemical Safety Cards

## BARIUM SULFATE

**ICSC: 0827**

Barium sulphate  
Blanc fixe  
Artificial barite  
BaSO₄  
Molecular mass: 233.43

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
<td></td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth.</td>
<td></td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles.

## STORAGE

R:  
S:  

## PACKAGING & LABELLING

---

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**International Chemical Safety Cards**

**BARIUM SULFATE**

**ICSC: 0827**

| **PHYSICAL STATE; APPEARANCE:** | ODORLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER. |
| **PHYSICAL DANGERS:** | Reacts violently with aluminium powder. |
| **CHEMICAL DANGERS:** | |
| **OCCUPATIONAL EXPOSURE LIMITS:** | |
| TLV: 10 mg/m³ as TWA; (ACGIH 2004). |
| MAK: (Inhalable fraction) 4 mg/m³; (Respirable fraction) 1.5 mg/m³; (DFG 2004). |
| OSHA PEL*: TWA 15 mg/m³ (total) TWA 5 mg/m³ (resp) |
| NIOSH REL: TWA 10 mg/m³ (total) TWA 5 mg/m³ (resp) |
| NIOSH IDLH: N.D. See: IDLH INDEX |
| **PHYSICAL PROPERTIES** | Melting point (decomposes): 1600°C |
| Density: 4.5 g/cm³ |
| Solubility in water: none |
| **ENVIRONMENTAL DATA** | |
| **NOTES** | Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits. |
| **ADDITIONAL INFORMATION** | |
| **ICSC: 0827** | BARIUM SULFATE |
| (C) IPCS, CEC, 1994 |

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Glucinium  
Be  
Atomic mass: 9.0

<table>
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<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Special powder, dry sand, NO other agents.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</td>
<td>IN ALL CASES CONSULT A DOCTOR!</td>
</tr>
<tr>
<td>SKIN</td>
<td>Redness.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Face shield or eye protection in combination with breathing protection if powder.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td></td>
<td>Rinse mouth. Do NOT induce vomiting. Refer for medical attention.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>
| Evacuate danger area! Consult an expert! Carefully collect the spilled substance into containers; if appropriate moisten first, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. | Separated from strong acids, bases food and feedstuffs | Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.  
Note: E  
T+ symbol  
R: 49-25-26-36/37/38-43-48/23  
S: 53-45  
UN Hazard Class: 6.1  
UN Subsidiary Risks: 4.1  
UN Packing Group: II |

SEE IMPORTANT INFORMATION ON BACK
**International Chemical Safety Cards**

**BERYLLIUM**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>GREY TO WHITE POWDER.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>Dust explosion possible if in powder or granular form, mixed with air.</td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>Reacts with strong acids and strong bases forming flammable/explosive gas (hydrogen - see ICSC0001) Forms shock sensitive mixtures with some chlorinated solvents, such as carbon tetrachloride and trichloroethylene.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV: 0.002 mg/m³ as TWA 0.01 mg/m³ as STEL A1 (confirmed human carcinogen); (ACGIH 2004). Intended change 0.00002 mg/m³ Skin, Inhal. SEN (ACGIH 2005). MAK: sensitization of respiratory tract and skin (Sab); Carcinogen category: 1; (DFG 2004). OSHA PEL: TWA 0.002 mg/m³ C 0.005 mg/m³ 0.025 mg/m³ 30-minute maximum peak NIOSH REL: Ca Not to exceed 0.0005 mg/m³ See Appendix A NIOSH IDLH: Ca 4 mg/m³ (as Be) See: IDLH INDEX</td>
</tr>
<tr>
<td>PHYSICAL PROPERTIES</td>
<td>Boiling point: above 2500°C Melting point: 1287°C Density: 1.9 g/cm³</td>
</tr>
<tr>
<td>Solubility in water:</td>
<td>none</td>
</tr>
<tr>
<td>ENVIRONMENTAL DATA</td>
<td>The substance is very toxic to aquatic organisms.</td>
</tr>
<tr>
<td>NOTES</td>
<td>Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Transport Emergency Card: TEC (R)-61GTF3-II NFPA Code: H3; F1; R0</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION</td>
<td></td>
</tr>
<tr>
<td>ICSC: 0226</td>
<td>BERYLLIUM</td>
</tr>
<tr>
<td>(C) IPCS, CEC, 1994</td>
<td></td>
</tr>
<tr>
<td>IMPORTANT LEGAL NOTICE:</td>
<td>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</td>
</tr>
</tbody>
</table>

**ROUTE OF EXPOSURE:**
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The aerosol of this substance is irritating to the respiratory tract Inhalation of dust or fumes may cause chemical pneumonitis. Exposure may result in death. The effects may be delayed. Medical observation is indicated.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact may cause skin sensitization. Lungs may be affected by repeated or prolonged exposure to dust particles, resulting in chronic beryllium disease (cough, weight loss, weakness). This substance is carcinogenic to humans.
Cd
Atomic mass: 112.4

ICSC: 0020
CAS #: 7440-43-9
RTECS #: EU9800000
UN #: 2570
EC #: 048-002-00-0

April 22, 2005 Peer reviewed

TYPES OF HAZARD/EXPOSURE

FIRE
Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.
Prevention: NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).
FIRST AID/FIRE FIGHTING: Dry sand. Special powder. NO other agents.

EXPLOSION
Finely dispersed particles form explosive mixtures in air.
Prevention: Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.

EXPOSURE
PREVENT DISPERSION OF DUST!
AVOID ALL CONTACT!
IN ALL CASES CONSULT A DOCTOR!

• INHALATION
Cough. Sore throat.
Local exhaust or breathing protection.
Fresh air, rest. Refer for medical attention.

• SKIN
Protective gloves.
Remove contaminated clothes. Rinse and then wash skin with water and soap.

• EYES
Redness. Pain.
Safety goggles or eye protection in combination with breathing protection.
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

• INGESTION
Do not eat, drink, or smoke during work.
Rest. Refer for medical attention.

SPILLAGE DISPOSAL
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.

STORAGE
Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants, acids, food and feedstuffs

PACKAGING & LABELLING
Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
PHYSICAL STATE; APPEARANCE:
SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium, causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (Total dust) 0.01 mg/m³ (Respirable fraction) 0.002 mg/m³ as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005).

MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).

OSHA PEL*: 1910.1027 TWA 0.005 mg/m³ *Note: The PEL applies to all Cadmium compounds (as Cd).

NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd).

NIOSH IDLH: Ca 9 mg/m³ (as Cd) See: IDLH INDEX

PHYSICAL PROPERTIES
Boiling point: 765°C
Melting point: 321°C
Density: 8.6 g/cm³

Solubility in water: none
Auto-ignition temperature: (cadmium metal dust) 250°C

ENVIRONMENTAL DATA
Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

NOTES
ADDITIONAL INFORMATION

ICSC: 0020
(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## CALCIUM

<table>
<thead>
<tr>
<th>ELEMENTAL CALCIUM</th>
<th>Ca</th>
</tr>
</thead>
</table>

**ICSC #** 1192  
**CAS #** 7440-70-2  
**RTECS #** EV8040000  
**UN #** 1401; 1855 (calcium pyrophoric)  
**EC #** 020-001-00-X  
October 24, 1994 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th><strong>FIRE</strong></th>
<th><strong>ACUTE HAZARDS/SYMPTOMS</strong></th>
<th><strong>PREVENTION</strong></th>
<th><strong>FIRST AID/FIRE FIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not combustible but forms flammable gas on contact with water or damp air. Highly flammable when finely divided. Forms flammable gas on contact with water or damp air. Many reactions may cause fire or explosion.</td>
<td>NO open flames, NO sparks, and NO smoking. NO contact with water and incompatible substances (see Chemical Dangers).</td>
<td>Special powder, dry sand, NO other agents. NO water.</td>
<td>In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>EXPLOSION</strong></th>
<th><strong>ACUTE HAZARDS/SYMPTOMS</strong></th>
<th><strong>PREVENTION</strong></th>
<th><strong>FIRST AID/FIRE FIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of fire and explosion on contact with water and incompatible substances (see Chemical Dangers).</td>
<td></td>
<td></td>
<td>PREVENT DISPERSION OF DUST!</td>
</tr>
</tbody>
</table>

### EXPOSURE

<table>
<thead>
<tr>
<th><strong>INHALATION</strong></th>
<th><strong>ACUTE HAZARDS/SYMPTOMS</strong></th>
<th><strong>PREVENTION</strong></th>
<th><strong>FIRST AID/FIRE FIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid inhalation of fine dust and mist.</td>
<td></td>
<td></td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SKIN</strong></th>
<th><strong>ACUTE HAZARDS/SYMPTOMS</strong></th>
<th><strong>PREVENTION</strong></th>
<th><strong>FIRST AID/FIRE FIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective gloves.</td>
<td></td>
<td></td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>EYES</strong></th>
<th><strong>ACUTE HAZARDS/SYMPTOMS</strong></th>
<th><strong>PREVENTION</strong></th>
<th><strong>FIRST AID/FIRE FIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Redness. Pain.</td>
<td></td>
<td></td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>INGESTION</strong></th>
<th><strong>ACUTE HAZARDS/SYMPTOMS</strong></th>
<th><strong>PREVENTION</strong></th>
<th><strong>FIRST AID/FIRE FIGHTING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
<td></td>
<td>Refer for medical attention.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Remove all ignition sources. Sweep spilled substance into containers. Do NOT wash away into sewer. Carefully collect remainder, then remove to safe place. Do NOT absorb in sawdust or other combustible absorbents. (Extra personal protection: complete protective clothing including self-contained breathing apparatus).

### STORAGE


### PACKAGING & LABELLING

Airtight. Unbreakable packaging: put breakable packaging into closed unbreakable container.  
F symbol  
R: 15  
S: 2-8-24/25-43  
UN Hazard Class: 4.3; 4.2 (calcium pyrophoric)  
UN Packing Group: II; I (calcium pyrophoric)

SEE IMPORTANT INFORMATION ON BACK

**ICSC: 1192**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**CALCIUM**

**I** PHYSICAL STATE; APPEARANCE: LUSTROUS SILVER WHITE METAL (WHEN FRESHLY CUT); TURNS BLUISH GREY ON EXPOSURE TO MOIST AIR.

**M** PHYSICAL DANGERS: Ignites in air when finely divided.

**P** CHEMICAL DANGERS: Reacts with water, alcohol diluted acids with evolution of highly flammable hydrogen gas. Reacts with halogens. Burns in air. Contact with alkali hydroxides or carbonates may cause detonation.

**O** OCCUPATIONAL EXPOSURE LIMITS: TLV not established.

**R** ROUTES OF EXPOSURE:

**T** INHALATION RISK:

**A** EFFECTS OF SHORT-TERM EXPOSURE: The substance irritates the eyes.

**N** EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

**T** Boiling point: 1440°C

**D** Melting point: 850°C

**A** Relative density (water = 1): 1.54

**T** Solubility in water: reaction

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
<th>ENVIRONMENTAL DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point: 1440°C</td>
<td>Reacts violently with fire extinguishing agents such as water, foam, halons and carbon dioxide. Do NOT take working clothes home.</td>
</tr>
<tr>
<td>Melting point: 850°C</td>
<td>Transport Emergency Card: TEC (R)-43G12; 42G13 (pyrophoric)</td>
</tr>
</tbody>
</table>

**NOTES**

NFPA Code: H1; F1; R2; W

**ADDITIONAL INFORMATION**

**ICSC: 1192**

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## Chemical Information

**ICSC:** 0029  
**CAS:** 7440-47-3  
**RTECS:** GB4200000  
October 27, 2004 Peer reviewed

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions.</td>
<td>No open flames if in powder form.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Protective gloves.</td>
<td></td>
<td>Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
<td>Rinse mouth.</td>
</tr>
</tbody>
</table>

### Spillage Disposal

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.

### Storage

| R: |
| S: |

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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## International Chemical Safety Cards

### CHROMIUM

**ICSC:** 0029

**Physical State; Appearance:** GREY POWDER

**Physical Dangers:** Dust explosion possible if in powder or granular form, mixed with air.

**Routes of Exposure:**

**Inhalation Risk:** A harmful concentration of airborne particles can be reached quickly when dispersed.
**CHEMICAL DANGERS:**
Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004).
- MAK not established.
- OSHA PEL*: TWA 1 mg/m³ See Appendix C *Note: The PEL also applies to insoluble chromium salts.
- NIOSH REL: TWA 0.5 mg/m³ See Appendix C
- NIOSH IDLH: 250 mg/m³ (as Cr) See: 7440473

**PHYSICAL PROPERTIES**
- Boiling point: 2642°C
- Melting point: 1900°C
- Density: 7.15 g/cm³
- Solubility in water: none

**EFFECTS OF SHORT-TERM EXPOSURE:**
May cause mechanical irritation to the eyes and the respiratory tract.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

**ENVIRONMENTAL DATA**

**NOTES**
The surface of the chromium particles is oxidized to chromium(III) oxide in air. See ICSC 1531 Chromium(III) oxide.

**ADDITIONAL INFORMATION**

**ICSC: 0029**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## COBALT

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Dust may ignite on contact with air or oxygen.</td>
<td>NO contact with oxidants.</td>
<td>Special powder, dry sand, NO other agents.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Finely dispersed particles form explosive mixtures in air. Risk of fire and explosion on contact with oxidants or acetylene.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td><strong>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough. Shortness of breath. Sore throat. Wheezing.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td></td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness.</td>
<td>Safety goggles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Abdominal pain. Vomiting.</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Give one or two glasses of water to drink.</td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

## STORAGE

Separated from strong oxidants. Store in an area without drain or sewer access.

## PACKAGING & LABELLING

Xn symbol  
R: 42/43-53  
S: 2-22-24-37-61

See important information on back

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**COBALT**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>SILVER-GREY POWDER.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td>Dust explosion possible if in powder or granular form, mixed with air.</td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>The substance may spontaneously ignite on contact with air or acetylene, when finely divided. Reacts with strong oxidants, causing fire and explosion hazard.</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV: 0.02 mg/m³ as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004). MAK: (Inhalable fraction) skin absorption (H); sensitization of respiratory tract and skin (Sah); Carcinogen category: 2; Germ cell mutagen group: 3A</td>
</tr>
<tr>
<td>OSHA PEL†</td>
<td>TWA 0.1 mg/m³</td>
</tr>
<tr>
<td>NIOSH REL</td>
<td>TWA 0.05 mg/m³</td>
</tr>
<tr>
<td>NIOSH IDLH</td>
<td>20 mg/m³ (as Co) See: 7440484</td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**

- Boiling point: 2870°C
- Melting point: 1493°C
- Density: 8.9 g/cm³
- Solubility in water: none

**ENVIRONMENTAL DATA**

The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish and in molluscs.

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance. Do NOT take working clothes home.

Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Spillage Disposal, Storage.

**ADDITIONAL INFORMATION**

<table>
<thead>
<tr>
<th>ICSC: 0782</th>
<th>(C) IPCS, CEC, 1994</th>
</tr>
</thead>
</table>

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[http://www.cdc.gov/niosh/ipcsneng/neng0782.html](http://www.cdc.gov/niosh/ipcsneng/neng0782.html)
# International Chemical Safety Cards

## COPPER

**ICSC: 0240**

**Cu**  
(powder)

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0240</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>7440-50-8</td>
</tr>
<tr>
<td>RTECS #</td>
<td>GL5325000</td>
</tr>
<tr>
<td>September 24, 1993 Validated</td>
<td></td>
</tr>
</tbody>
</table>

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th></th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKIN</td>
<td>Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>EYES</td>
<td>Redness. Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).

### STORAGE

Separated from - See Chemical Dangers.

### PACKAGING & LABELLING

R:  
S:

### SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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# International Chemical Safety Cards

## COPPER

**PHYSICAL STATE; APPEARANCE:**  
RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

**PHYSICAL DANGERS:**  
- I

**CHEMICAL DANGERS:**  
- M

**ROUTES OF EXPOSURE:**  
The substance can be absorbed into the body by inhalation and by ingestion.

**INHALATION RISK:**  
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: 0.2 mg/m³ fume (ACGIH 1992-1993).
- TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993).
- Intended change 0.1 mg/m³
- Inhal., A4 (not classifiable as a human carcinogen);
- MAK: 0.1 mg/m³ (Inhalable fraction)
- Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005).
- OSHA PEL*: TWA 1 mg/m³ *Note: The PEL also applies to other copper compounds (as Cu) except copper fume.
- NIOSH REL*: TWA 1 mg/m³ *Note: The REL also applies to other copper compounds (as Cu) except Copper fume.
- NIOSH IDLH: 100 mg/m³ (as Cu) See: 7440508

**PHYSICAL PROPERTIES**
- Boiling point: 2595°C
- Melting point: 1083°C
- Relative density (water = 1): 8.9

**Solubility in water:**
- none

**ENVIRONMENTAL DATA**

**NOTES**

The symptoms of metal fume fever do not become manifest until several hours.

**ADDITIONAL INFORMATION**

**ICSC: 0240 COPPER**

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**IRON (III)-o-ARSENITE, PENTAHYDRATE**

Ferric arsenite
\[ \text{As}_2\text{Fe}_2\text{O}_6 \cdot \text{Fe}_2\text{O}_3 \cdot 5\text{H}_2\text{O} \]

Molecular mass: 607.3

**ICSC #** 1241

**CAS #** 63989-69-5

**RTECS #** NO4600000

**UN #** 1607

**EC #** 033-002-00-5

October 27, 1994 Validated

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough. Shortness of breath. Sore throat. Weakness. See Ingestion.</td>
<td>Avoid inhalation of fine dust and mist. Closed system and ventilation.</td>
<td>Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Redness. Pain.</td>
<td>Safety goggles or eye protection in combination with breathing protection if powder.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Vacuum spilled material. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.

### STORAGE

Separated from food and feedstuffs.

### PACKAGING & LABELLING

Unbreakable packaging: put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Marine pollutant.

Note: A, 1
T symbol
N symbol
R: 23/25-50/53
S: 1/2-20/21-28-45-60-61
UN Hazard Class: 6.1
UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

**ICSC: 1241**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
IRON (III)-o-ARSENITE, PENTAHYDRATE

PHYSICAL STATE; APPEARANCE:
BROWN POWDER.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes on heating or on burning
producing toxic fumes of arsenic and iron.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: (as As) 0.01 mg/m³ as TWA; A1 (confirmed human
carcinogen); BEI issued; (ACGIH 2004).

MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A;
(DFG 2004).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation
of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration
of airborne particles can, however, be reached quickly when
dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes, the skin and the
respiratory tract. The substance may cause effects on the
nervous system, liver, skin, kidneys and gastrointestinal
tract, resulting in kidney impairment, neuropathy, severe
gastroenteritis, degenerative liver damage and dermatitis.
Exposure may result in death. The effects may be delayed.
Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED
EXPOSURE:
Repeated or prolonged contact with skin may cause
dermatitis, grey skin and hyperkeratosis. The substance may
have effects on the nervous system, liver, cardiovascular
system and respiratory tract, resulting in neuropathy,
gangrene, degenerative liver damage and perforation of
nasal septum. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES
Solubility in water: none

ENVIRONMENTAL DATA
This substance may be hazardous to the environment; special attention should be given to plants, air quality
and water quality. It is strongly advised that this substance does not enter the environment.

NOTES
Do NOT take working clothes home. See also ICSC0013 Arsenic. Card has been partly updated in April and October 2005. See sections
Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-61GT5-II

ADDITIONAL INFORMATION

ICSC: 1241
IRON (III)-o-ARSENITE, PENTAHYDRATE
(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
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verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the
U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
Lead metal  
Plumbum  
Pb  
Atomic mass: 207.2  
(powder)

ICSC #  0052  
CAS #  7439-92-1  
RTECS #  OF7525000  
October 08, 2002 Peer reviewed

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent dispersion of dust! Avoid exposure of (pregnant) women!</td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.</td>
<td>Prevent dispersion of dust! Avoid exposure of (pregnant) women!</td>
</tr>
<tr>
<td>INHALATION</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td>SKIN</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>EYES</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.

### STORAGE

Separated from food and feedstuffs incompatible materials See Chemical Dangers.

### PACKAGING & LABELLING

R: 
S: 

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See important information on back
### PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

### PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

### CHEMICAL DANGERS:
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

### OCCUPATIONAL EXPOSURE LIMITS:

| TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). |
| MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004). |
| EU OEL: as TWA 0.15 mg/m³ (EU 2002). |
| OSHA PEL*: 1910.1025 TWA 0.050 mg/m³* See Appendix C |
| NIOSH REL*: TWA 0.050 mg/m³ See Appendix C |

*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.  
*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.  
NIOSH IDLH: 100 mg/m³ (as Pb) See: 7439921

### ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

### INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

### EFFECTS OF SHORT-TERM EXPOSURE:

### EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

### PHYSICAL PROPERTIES
- Boiling point: 1740°C
- Melting point: 327.5°C
- Density: 11.34 g/cm³
- Solubility in water: none

### ENVIRONMENTAL DATA
Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

### NOTES
Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

### ADDITIONAL INFORMATION

### ICSC: 0052  LEAD

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MAGNESIUM (POWDER) ICSC: 0289

ICSC #  0289  
CAS #  7439-95-4
RTECS #  OM2100000
UN #  1418
EC #  012-001-00-3 (pyrophoric)
April 12, 2000 Peer reviewed

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking. NO contact with moisture, acids, halogens and many other substances.</td>
<td>Special powder, dry sand, NO other agents. NO water.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Do NOT expose to friction or shock. Prevent build-up of electrostatic charges (e.g., by grounding).</td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td>PREVENT DISPERSION OF DUST!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Abdominal pain. Diarrhoea. Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**PHYSICAL DANGERS:**
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

**CHEMICAL DANGERS:**
The substance may spontaneously ignite on contact with air or moisture producing irritating or toxic fumes. Reacts violently with strong oxidants. Reacts violently with many substances causing fire and explosion hazard. Reacts with acids and water forming flammable/explosive gas (hydrogen - see ICSC0001) causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV not established.
MAK not established.

**PHYSICAL PROPERTIES**
- Boiling point: 1100°C
- Melting point: 651°C
- Density: 1.7 g/cm³
- Solubility in water: none
- Auto-ignition temperature: 473°C
- Explosive limits, vol% in air: see Notes

**ENVIRONMENTAL DATA**
Burns with an intense flame. In order to prevent eye injury do not look directly at magnesium fires. Reacts violently with fire extinguishing agents such as water, carbon dioxide and powder. Explosive limits, vol% in air: (LEL) 0.03 kg/m³.

**NOTES**
Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R2;

**ADDITIONAL INFORMATION**

**ICSC: 0289**
(C) IPCS, CEC, 1994

**MAGNESIUM (POWDER)**

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MANGANESE

ICSC: 0174

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Dry sand, special powder.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• INHALATION</td>
<td>Cough.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>• SKIN</td>
<td></td>
<td>Protective gloves.</td>
<td>Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>• EYES</td>
<td>Safety goggles, or eye protection in combination with breathing protection if powder.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Abdominal pain. Nausea.</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
</tr>
</tbody>
</table>

SPILLAGE DISPOSAL

Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles.)

STORAGE

Separated from acids. Dry.

PACKAGING & LABELLING

SEE IMPORTANT INFORMATION ON BACK

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INTERNATIONAL CHEMICAL SAFETY CARDS

MANGANESE

ICSC: 0174

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>GREY - WHITE POWDER</th>
<th>ROUTES OF EXPOSURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</td>
</tr>
</tbody>
</table>

http://www.cdc.gov/niosh/ipcsneng/neng0174.html
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
Reacts slowly with water more rapidly with steam and acids forming flammable/explosive gas (hydrogen - see ICSC0001) causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: 0.2 mg/m³ (as TWA); (ACGIH 2003).
- MAK: (Inhalable fraction) 0.5 mg/m³; Pregnancy risk group: C; (DFG 2007).
- OSHA PEL*: C 5 mg/m³ *Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl and Methyl cyclopentadienyl manganese tricarbonyl.
- NIOSH REL*: TWA 1 mg/m³ ST 3 mg/m³ *Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl, Methyl cyclopentadienyl manganese tricarbonyl, and Manganese tetroxide.
- NIOSH IDLH: 500 mg/m³ (as Mn) See: 7439965

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**
The aerosol is irritating to the respiratory tract.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
The substance may have effects on the lungs and central nervous system, resulting in increased susceptibility to bronchitis, pneumonitis and neurologic, neuropsychiatric disorders (manganism). Animal tests show that this substance possibly causes toxicity to human reproduction or development.

**PHYSICAL PROPERTIES**
- Boiling point: 1962°C
- Melting point: 1244°C
- Density: 7.47 g/cm³

**Solubility in water:**
none

**ENVIRONMENTAL DATA**
This substance may be hazardous in the environment; special attention should be given to aquatic organisms.

**NOTES**
Depending on the degree of exposure, periodic medical examination is suggested. The recommendations on this Card also apply to ferro manganese.

**ADDITIONAL INFORMATION**

**ICSC: 0174**
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**MANGANESE**

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# MERCURY

ICSC: 0056

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
<td></td>
</tr>
<tr>
<td>EXPLOSION</td>
<td>Risk of fire and explosion.</td>
<td>In case of fire: keep drums, etc., cool by spraying with water.</td>
<td></td>
</tr>
<tr>
<td>EXPOSURE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SKIN</td>
<td>MAY BE ABSORBED! Redness.</td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.</td>
</tr>
<tr>
<td>• EYES</td>
<td></td>
<td>Face shield, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>• INGESTION</td>
<td>Do not eat, drink, or smoke during work. Wash hands before eating.</td>
<td></td>
<td>Refer for medical attention.</td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.

## STORAGE
Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.

## PACKAGING & LABELLING
Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

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PHYSICAL STATE; APPEARANCE:
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 0.1 mg/m³ Sh
Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003).
OSHA PEL: C 0.1 mg/m³
NIOSH REL: Hg Vapor: TWA 0.05 mg/m³ skin
Other: C 0.1 mg/m³ skin
NIOSH IDLH: 10 mg/m³ (as Hg) See: 7439976

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system and kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES
Boiling point: 357°C
Melting point: -39°C
Relative density (water = 1): 13.5
Solubility in water: none
Vapour pressure, Pa at 20°C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009

ENVIRONMENTAL DATA
The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

NOTES
Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

ICSC: 0056
(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:
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**NIQUEL**

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0062</th>
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</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>7440-02-0</td>
</tr>
<tr>
<td>RTECS #</td>
<td>QR5950000</td>
</tr>
<tr>
<td>EC #</td>
<td>028-002-00-7</td>
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</table>

**October 17, 2001 Peer reviewed**

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/ SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/ FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Flammable as dust. Toxic fumes may be released in a fire.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>Dry sand. NO carbon dioxide. NO water.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td><strong>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough. Shortness of breath.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Protective gloves. Protective clothing.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
<td></td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Safety spectacles, or eye protection in combination with breathing protection.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.</td>
<td>Separated from strong acids.</td>
<td>Xn symbol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: 40-43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S: 2-22-36</td>
</tr>
</tbody>
</table>

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**
Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV: (Inhalable fraction) 1.5 mg/m³ as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004).
- MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah); Carcinogen category: 1; (DFG 2004).
- OSHA PEL*: TWA 1 mg/m³ *Note: The PEL does not apply to Nickel carbonyl.
- NIOSH REL*: Ca TWA 0.015 mg/m³ See Appendix A
*Note: The REL does not apply to Nickel carbonyl.
- NIOSH IDLH: Ca 10 mg/m³ (as Ni) See: 7440020

**INHALATION RISK:**
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**
May cause mechanical irritation. Inhalation of fumes may cause pneumonitis.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**
- Boiling point: 2730°C
- Melting point: 1455°C
- Density: 8.9 g/cm³
- Solubility in water: none

**ENVIRONMENTAL DATA**
At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

**ADDITIONAL INFORMATION**

**ICSC: 0062**
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**NICKEL**

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# International Chemical Safety Cards

## POTASSIUM

Kalium  
K  
Atomic mass: 39.1

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0716</th>
</tr>
</thead>
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<tr>
<td>CAS #</td>
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<tr>
<td>RTECS #</td>
<td>TS6460000</td>
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<tr>
<td>UN #</td>
<td>2257</td>
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<tr>
<td>EC #</td>
<td>019-001-00-2</td>
</tr>
</tbody>
</table>

April 06, 2006 Validated

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO contact with water, acid(s) or halogens. NO open flames, NO sparks, and NO smoking.</td>
<td>Special powder, dry sand, NO other agents.</td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INHALATION</strong></td>
<td>Cough. Sore throat. Burning sensation.</td>
<td>Closed system and ventilation.</td>
<td>Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.</td>
</tr>
<tr>
<td><strong>EYES</strong></td>
<td>Severe deep burns. loss of vision.</td>
<td>Face shield.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>INGESTION</strong></td>
<td>Burning sensation. Shock or collapse.</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth. Refer for medical attention.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>STORAGE</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>

SEE IMPORTANT INFORMATION ON BACK

http://www.cdc.gov/niosh/ipcsneng/neng0716.html
## POTASSIUM

### PHYSICAL STATE; APPEARANCE:
WHITE TO GREY LUMPS

### PHYSICAL DANGERS:

### CHEMICAL DANGERS:
Reacts violently with water, causing fire and explosion hazard. The substance decomposes rapidly under the influence of air and moisture, forming flammable/explosive gas (Hydrogen - see ICSC0001).

### OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK not established.

### PHYSICAL PROPERTIES
<table>
<thead>
<tr>
<th>Boiling point: 765.5°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point: 63.2°C</td>
</tr>
<tr>
<td>Density: 0.856 g/cm³</td>
</tr>
</tbody>
</table>

### Solubility in water, g/100 ml: (reaction)
Vapour pressure, Pa at 20°C: negligible

### ENVIRONMENTAL DATA

### NOTES
Potassium is always kept under mineral oil. Reacts violently with fire extinguishing agents such as water and carbon dioxide.

Transport Emergency Card: TEC (R)-43S2257a
NFPA Code: H3; F3; R2;

### ADDITIONAL INFORMATION

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# SELENIUM

ICSC: 0072

### International Chemical Safety Cards

Se

Atomic mass: 79.0

(powder)

<table>
<thead>
<tr>
<th>ICSC #</th>
<th>0072</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS #</td>
<td>7782-49-2</td>
</tr>
<tr>
<td>RTECS #</td>
<td>VS7700000</td>
</tr>
<tr>
<td>EC #</td>
<td>034-001-00-2</td>
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</tbody>
</table>

April 26, 1993 Peer reviewed

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with oxidants.</td>
<td>Powder, AFFF, foam, carbon dioxide. NO water</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLOSION</th>
<th>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</th>
</tr>
</thead>
</table>


| EYES | Redness. Pain. Blurred vision. | Safety spectacles or eye protection in combination with breathing protection. | First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. |

| INGESTION | Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation). | Do not eat, drink, or smoke during work. | Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention. |

## SPILLAGE DISPOSAL

Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.

## STORAGE

Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs. Dry.

## PACKAGING & LABELLING

Airtight. Do not transport with food and feedstuffs. T symbol
R: 23/25-33-53
S: 1/2-20/21-28-45-61

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**SELENIUM**

| ICSC: 0072 |

**PHYSICAL STATE: APPEARANCE:**
Odourless solid in various forms. Dark red-brown to bluish-black amorphous solid or red transparent crystals or metallic grey to black crystals.

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**
Upon heating, toxic fumes are formed. Reacts violently with oxidants, strong acids. Reacts with water at 50°C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorus and metals such as nickel, zinc, sodium, potassium, platinum.

**OCCUPATIONAL EXPOSURE LIMITS:**
TLV: 0.2 mg/m³ as TWA (ACGIH 2004).

MAK: (Inhalable fraction) 0.05 mg/m³
Peak limitation category: II(4); Carcinogen category: 3B;
Pregnancy risk group: C;
(DFG 2004).

OSHA PEL*: TWA 0.2 mg/m³ *Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride.

NIOSH REL*: TWA 0.2 mg/m³ *Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride.

NIOSH IDLH: 1 mg/m³ (as Se) See: 7782492

**PHYSICAL PROPERTIES**
- Boiling point: 685°C
- Melting point: 170-217°C
- Relative density (water = 1): 4.8
- Solubility in water: none
- Vapour pressure, Pa at 20°C: 0.1

**ENVIRONMENTAL DATA**

**NOTES**

Do NOT take working clothes home.

**ADDITIONAL INFORMATION**

**ICSC: 0072**

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ARGENTIUM (Ag)

**ICSC #** 0810  
**CAS #** 7440-22-4  
**RTECS #** VW3500000  
September 10, 1997 Validated

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible, except as powder.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>INHALATION</strong></td>
<td>Local exhaust or breathing protection.</td>
<td>Rinse skin with plenty of water or shower.</td>
<td></td>
</tr>
<tr>
<td>• <strong>SKIN</strong></td>
<td>Protective gloves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>EYES</strong></td>
<td>Safety spectacles, or eye protection in combination with breathing protection if powder.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
<td></td>
</tr>
<tr>
<td>• <strong>INGESTION</strong></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Spillage Disposal

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.

### Storage

Separated from ammonia, strong hydrogen peroxide solutions, strong acids.

### Packaging & Labelling

**PHYSICAL STATE; APPEARANCE:** White metal; turns dark on exposure to ozone, hydrogen sulfide or sulfur.

**Physical Dangers:**

**Chemical Dangers:** Shock-sensitive compounds are formed with acetylene.

**Routes of Exposure:**

The substance can be absorbed into the body by inhalation and by ingestion.

**Inhalation Risk:**

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry.

**OCCUPATIONAL EXPOSURE LIMITS:**
- TLV (metal): 0.1 mg/m³ (ACGIH 1997).
- EU OEL: 0.1 mg/m³ as TWA (EU 2000).
- OSHA PEL: TWA 0.01 mg/m³
- NIOSH REL: TWA 0.01 mg/m³
- NIOSH IDLH: 10 mg/m³ (as Ag) See: IDLH INDEX

**EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis).

**PHYSICAL PROPERTIES**
- Boiling point: 2212°C
- Melting point: 962°C
- Relative density (water = 1): 10.5
- Solubility in water: none

**ENVIRONMENTAL DATA**
This substance may be hazardous to the environment; special attention should be given to aquatic organisms.

**NOTES**
Card has been partially updated in March 2008: see Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0810**
(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**SODIUM**

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<th>ICSC #</th>
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<tr>
<td>CAS #</td>
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<td>RTECS #</td>
<td>VY0686000</td>
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<tr>
<td>UN #</td>
<td>1428</td>
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<tr>
<td>EC #</td>
<td>011-001-00-0</td>
</tr>
</tbody>
</table>

**Atomic mass:** 23.0

---

## TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>HIGHLY FLAMMABLE</th>
<th>NO CONTACT WITH WATER, ACID(S) OR HALOGENS, NO OPEN FLAMES, NO SPARKS, AND NO SMOKING.</th>
<th>SPECIAL POWDER, DRY SAND, NO OTHER AGENTS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLOSION</td>
<td>RISK OF FIRE AND EXPLOSION ON CONTACT WITH ACID(S), HALOGENS, WATER</td>
<td></td>
<td>COMBAT FIRE FROM A SHELTERED POSITION.</td>
</tr>
</tbody>
</table>

## ACUTE HAZARDS/SYMPTOMS

<table>
<thead>
<tr>
<th>INHALATION</th>
<th>COUGH, SORE THROAT, BURNING SENSATION</th>
<th>CLOSED SYSTEM AND VENTILATION</th>
<th>FRESH AIR, REST. HALF-UPRIGHT POSITION. ARTIFICIAL RESPIRATION MAY BE NEEDED. REFER FOR MEDICAL ATTENTION.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKIN</td>
<td>PAIN, BLISTERS, SERIOUS SKIN BURNS</td>
<td>PROTECTIVE GLOVES, PROTECTIVE CLOTHING</td>
<td>REMOVE CONTAMINATED CLOTHES. RINSE SKIN WITH PLENTY OF WATER OR SHOWER. REFER FOR MEDICAL ATTENTION.</td>
</tr>
<tr>
<td>EYES</td>
<td>SEVERE DEEP BURNS, LOSS OF VISION</td>
<td>FACE SHIELD</td>
<td>FIRST RINSE WITH PLENTY OF WATER FOR SEVERAL MINUTES (REMOVE CONTACT LENSES IF EASILY POSSIBLE), THEN TAKE TO A DOCTOR.</td>
</tr>
<tr>
<td>INGESTION</td>
<td>BURNING SENSATION, SHOCK OR COLLAPSE</td>
<td>DO NOT EAT, DRINK, OR SMOKE DURING WORK.</td>
<td>RINSE MOUTH. REFER FOR MEDICAL ATTENTION.</td>
</tr>
</tbody>
</table>

## SPILLAGE DISPOSAL

Evacuate danger area! Consult an expert! Chemical protection suit including self-contained breathing apparatus. Cover the spilled material with dry powder.

## STORAGE


## PACKAGING & LABELLING

Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. F symbol C symbol R: 14/15-34 S: (1/2)-5 -8-43-45 UN Hazard Class: 4.3 UN Packing Group: I Signal: Danger Flame-Corr In contact with water releases flammable gases which may ignite spontaneously Causes severe skin burns and eye damage

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SEE IMPORTANT INFORMATION ON BACK

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http://www.cdc.gov/niosh/ipcsneng/neng0717.html
**SODIUM**

<table>
<thead>
<tr>
<th>PHYSICAL STATE; APPEARANCE:</th>
<th>SILVERY SOLID IN VARIOUS FORMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL DANGERS:</td>
<td></td>
</tr>
<tr>
<td>CHEMICAL DANGERS:</td>
<td>Reacts violently with water, causing fire and explosion hazard. The substance decomposes rapidly under the influence of air and moisture, forming flammable/explosive gas (Hydrogen - see ICSC0001).</td>
</tr>
<tr>
<td>OCCUPATIONAL EXPOSURE LIMITS:</td>
<td>TLV not established. MAK not established.</td>
</tr>
<tr>
<td>Routes of Exposure:</td>
<td>Serious local effects by all routes of exposure.</td>
</tr>
<tr>
<td>Inhalation Risk:</td>
<td></td>
</tr>
<tr>
<td>Effects of Short-Term Exposure:</td>
<td>See ICSC 0360 (Sodium hydroxide)</td>
</tr>
<tr>
<td>Effects of Long-Term or Repeated Exposure:</td>
<td></td>
</tr>
</tbody>
</table>

**PHYSICAL PROPERTIES**
- Boiling point: 880°C
- Melting point: 97.4°C
- Density: 0.97 g/cm³
- Solubility in water: reaction
- Vapour pressure, Pa at 20°C: negligible
- Auto-ignition temperature: 120-125°C

**ENVIRONMENTAL DATA**
Sodium is always kept under mineral oil. Reacts violently with fire extinguishing agents such as water and carbon dioxide.

**NOTES**
Transport Emergency Card: TEC (R)-43S1428a
NFPA Code: H3; F3; R2;

**ADDITIONAL INFORMATION**

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# International Chemical Safety Cards

## VANADINIUM TRIOXIDE

**ICSC: 0455**

<table>
<thead>
<tr>
<th>Divanadium trioxide</th>
<th>Vanadium sesquioxide</th>
<th>Vanadic oxide</th>
<th>Vanadium(III) oxide</th>
<th>V₂O₃</th>
</tr>
</thead>
</table>

**Molecular mass:** 149.9

**ICSC #** 0455  
**CAS #** 1314-34-7  
**RTECS #** YW3050000  
**UN #** 3285  
**Validated:** April 04, 2006

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>In case of fire in the surroundings: all extinguishing agents allowed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPLOSION

**PREVENT DISPERSION OF DUST!**

### EXPOSURE

#### • INHALATION

*Sore throat. Cough. Symptoms may be delayed (see Notes).*  
*Local exhaust or breathing protection.*  
*Fresh air, rest.*

#### • SKIN

*Redness.*  
*Protective gloves.*  
*Remove contaminated clothes. Rinse skin with plenty of water or shower.*

#### • EYES

*Redness.*  
*Safety goggles or eye protection in combination with breathing protection.*  
*First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.*

#### • INGESTION

*Do not eat, drink, or smoke during work.*  
*Rinse mouth. Refer for medical attention.*

### SPILLAGE DISPOSAL

*Personal protection: P3 filter respirator for toxic particles. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.*

### STORAGE

*Separated from food and feedstuffs.*

### PACKAGING & LABELLING

*Do not transport with food and feedstuffs.*  
*UN Hazard Class: 6.1*  
*UN Packing Group: III*  
*Signal: Warning*  
*Excl mark-Health haz*  
*Harmful if inhaled dust*  
*Suspected of causing cancer*

---

See important information on back.

**ICSC: 0455**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
**VANADIUM TRIOXIDE**

| I | PHYSICAL STATE; APPEARANCE: BLACK POWDER. |
| M | PHYSICAL DANGERS: |
| P | CHEMICAL DANGERS: |
| O | The substance decomposes on heating producing toxic fumes (vanadium oxides). |
| R | OCCUPATIONAL EXPOSURE LIMITS: |
| T | TLV not established. |
| A | MAK (V and its inorganic compounds): |
| N | Carcinogen category: 2; Germ cell mutagen group: 2 (DFG 2005). |
| T | |
| D | |
| A | |
| T | |

**PHYSICAL PROPERTIES**

- Melting point: 1970°C
- Density: 4.87 g/cm³
- Solubility in water, g/100 ml at 20°C: 0.01 (very poor)

**ENVIRONMENTAL DATA**

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Respiratory symptoms may be delayed 1 day or more. See also ICSC 0596 Vanadium pentoxide.

Transport Emergency Card: TEC (R)-61GT5-III
Card has been partially updated in January 2008: see GHS classification.

**ADDITIONAL INFORMATION**

ICSC: 0455  (C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
# Zinc Powder

**ICSC: 1205**

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>FIRE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base(s) and incompatible substances (see Chemical Dangers).</td>
<td>Special powder, dry sand, NO other agents. NO water.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPLOSION</th>
<th>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.</td>
<td>Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.</td>
</tr>
</tbody>
</table>

### Exposure

- **Inhalation**: Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).
- **Skin**: Dry skin.
- **Eyes**: Safety spectacles.

### Spillage Disposal

Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers, then remove to safe place. Personal protection: self-contained breathing apparatus.

### Storage

Fireproof. Separated from acids, bases oxidants. Dry.

### Packaging & Labelling

- Airtight.
- F symbol
- N symbol
- R: 15-17-50/53
- S: 2-7/8-43-46-60-61
- UN Hazard Class: 4.3
- UN Subsidiary Risks: 4.2

### Important Information

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
ZINC POWDER

PHYSICAL STATE; APPEARANCE:
ODOURLESS GREY TO BLUE POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

PHYSICAL PROPERTIES
Boiling point: 907°C
Melting point: 419°C
Relative density (water = 1): 7.14

Solubility in water: reaction
Vapour pressure, kPa at 487°C: 0.1
Auto-ignition temperature: 460°C

ENVIRONMENTAL DATA

NOTES
Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R1;

ADDITIONAL INFORMATION

ICSC: 1205
(C) IPCS, CEC, 1994

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APPENDIX D

HOSPITAL INFORMATION AND MAP

FIELD ACCIDENT REPORT
# FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>PROJECT NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Accident</td>
<td>Time</td>
</tr>
</tbody>
</table>

Type of Accident (Check One):

- ( ) Vehicular
- ( ) Personal
- ( ) Property

Name of Injured

DOB or Age

How Long Employed

Names of Witnesses

Description of Accident

Action Taken

Did the Injured Lose Any Time? How Much (Days/Hrs.)?

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)?

(If not, it is the EMPLOYEE’S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW
HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

LINCOLN MEDICAL AND MENTAL HEALTH CENTER

718-579-5016
0.92 Miles – About 3 Minutes
1. Start out going northeast on Lincoln Ave toward E 134th St. 0.08 mi

2. Turn left onto E 135th St.
   New Life For Better Living is on the corner
   If you reach E 135th St you've gone a little too far
   0.2 mi

3. E 135th St becomes Park Ave. 0.5 mi

4. Turn right onto E 149th St.
   E 149th St is just past E 148th St
   If you reach E 151st St you've gone about 0.1 miles too far
   0.06 mi

5. 234 E 149TH ST is on the right.
   If you reach Morris Ave you've gone a little too far