



May 21, 2015

Mr. Henry Willems  
NYSDEC  
DER, Remedial Bureau C  
625 Broadway, 11th Floor  
Albany, NY 12233-7014

*Re: Former Sunbelt Equipment  
25 Kent Ave. Brooklyn, NY 11249  
NYSBCP Site # C224207  
Supplemental Investigation Work Plan*

Dear Mr. Willems:

As requested Environmental Business Consultants (EBC) has prepared the following plan for advancing additional soil borings and for investigating the utility tunnel at the above referenced Site.

## **SAMPLING AND ANALYSIS PLAN**

### Soil Borings

Fourteen soil borings (15B1 through 15B14) will be advanced across the Site as follows:

- Two borings in the eastern portion of the Site in the vicinity of the former iron works;
- Two borings in the south central portion of the Site in the vicinity of the former varnish works;
- Ten borings in the western portion of the site in the vicinity of the former petroleum works.

At all soil boring locations, soil samples will be collected continuously in 5-foot intervals using a Geoprobe™ dual-tube sampling system. The Geoprobe™ uses a direct push hydraulic percussion system to drive and retrieve core samplers. A track-mounted Geoprobe™ model 6620DT or equivalent will be utilized.

Soil samples will be retrieved using a 1.5-inch diameter, 5-foot long core sampler with disposable acetate liners with sediment catch ends and the dual-tube method to preserve sample integrity. At each soil boring location, sampling will continue to a depth of 30 feet below grade. If the Geoprobe equipment cannot reach the target depth, an alternate drilling method will be used.

Collected soil samples will be photographed and characterized by an environmental professional and field screened for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID). All observations will be recorded in a bound project dedicated field book which will be used to prepare a boring log for each soil boring location. Recorded



observations will include sample depth, sample recovery, soil type evidence of water (if encountered), PID reading and physical evidence of contamination (odor, staining, sheen, etc.).

#### Utility Tunnel Inspection

The location of the utility tunnel has been documented in previous reports. A track mounted excavator will be used to expose the top of the tunnel and determine how far onto the Site it extends by excavating to expose the end. The top of the tunnel will then be opened for visual inspection and to determine the best way to seal it at the property line. An EP will document the observations and measurements in a bound notebook along with photographs so that the tunnel can be represented on a scaled site plan.

### **QUALITY ASSURANCE / QUALITY CONTROL**

Collected samples will be appropriately packaged and screened by field personnel using a photoionization detector (PID). The PID will be calibrated to an isobutylene standard in accordance with the manufacturer's specifications.

Dedicated disposable sampling materials will be used for soil samples. However, if non-dedicated, disposable materials are used they will be decontaminated as follows:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash withalconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

Note the decontamination area will move with the drilling equipment so that it remains in close proximity to the work area.

### **MANAGEMENT OF INVESTIGATION DERIVED WASTES**

Investigation derived waste includes contaminated soil and disposable sampling equipment generated during the remedial investigation.

Soil from borings will be placed in U.S. Department of Transportation (DOT) – approved drums. This material will either be disposed of at an appropriate off-site disposal facility or will be disposed along with other soil during subsequent remedial activities to be implemented under the RAWP.

Disposable sampling equipment (gloves, tubing, acetate liners, etc.) will be placed in heavy-duty plastic bags and disposed of properly.

The Site grounds are all fully secured and locked at all times preventing unauthorized and public access to the Site.



## **HEALTH AND SAFETY PLAN**

The Health and Safety Plan (HASP) takes into account the specific hazards inherent in conducting the RI, and presents the minimum requirements which are to be met by Environmental Business Consultants (EBC), its subcontractors, and other personnel in order to avoid and, if necessary, protect against health and/or safety hazards. A HASP has been prepared and is attached to this work plan.

Sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in the RI HASP prepared by EBC and must be made available to EBC and the NYSDEC.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. Modifications to the HASP may be made with the approval of the EBC Site Safety Manager (SSM) and/or Project Manager (PM).

## **COMMUNITY AIR MONITORING PLAN**

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site commercial workers) from potential airborne contaminant releases resulting from investigation activities.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the investigation work did not spread contamination off-site through the air.

The primary concerns during the investigation are odors from VOCs. The CAMP for this investigation is attached.

## **SCHEDULE**

Mobilization for the field work is anticipated to begin immediately upon approval from the DEC. The estimated duration of the activity is one week total field time.

The anticipated schedule of events is as follows:

<b>Schedule Task</b>	<b>Estimated Date</b>
NYSDEC Approval of Supplemental Work Plan	Week of May 18, 2015
Mobilize equipment to the Site (begin)	Within 1 week of approval of RIWP
Complete Field Work	Within 1 week of mobilization date
Submit Remedial Supplemental Investigation Report	Within 1 week of completion of field work





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The findings of the investigation including drill logs, photographs and drawings will be provided to DEC upon completion of the work. Please contact me with any questions or comments. As agreed, the work is scheduled to begin on Wednesday, May 27, 2015.

Very truly yours,

A handwritten signature in blue ink that reads 'Charles B. Sosik'.

Charles B. Sosik, P.G.

Principal



**ENVIRONMENTAL BUSINESS CONSULTANTS**

1808 MIDDLE COUNTRY ROAD  
RIDGE, NY 11961

PHONE 631.504.6000  
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# **FIGURES**

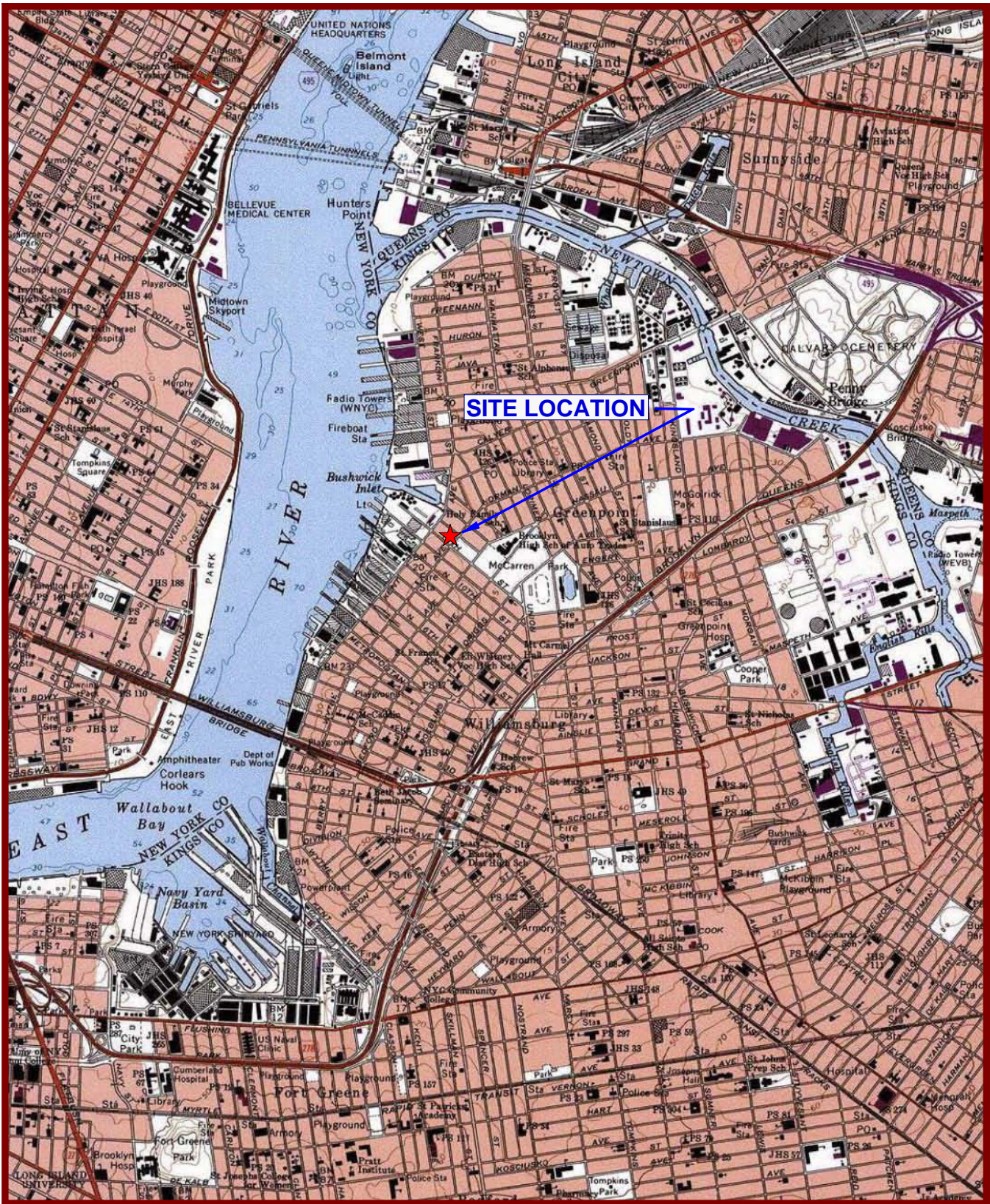


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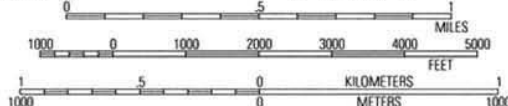
**PHONE 631.504.6000  
FAX 631.924.2870**





40°45.000' N  
40°44.000' N  
40°43.000' N  
40°42.000' N

73°59.000' W      73°58.000' W      73°57.000' W      WGS84 73°56.000' W



MN ↑ TN  
13°  
06/04/11

USGS Brooklyn Quadrangle 1995, Contour Interval = 10 feet

**EBC**  
ENVIRONMENTAL BUSINESS CONSULTANTS

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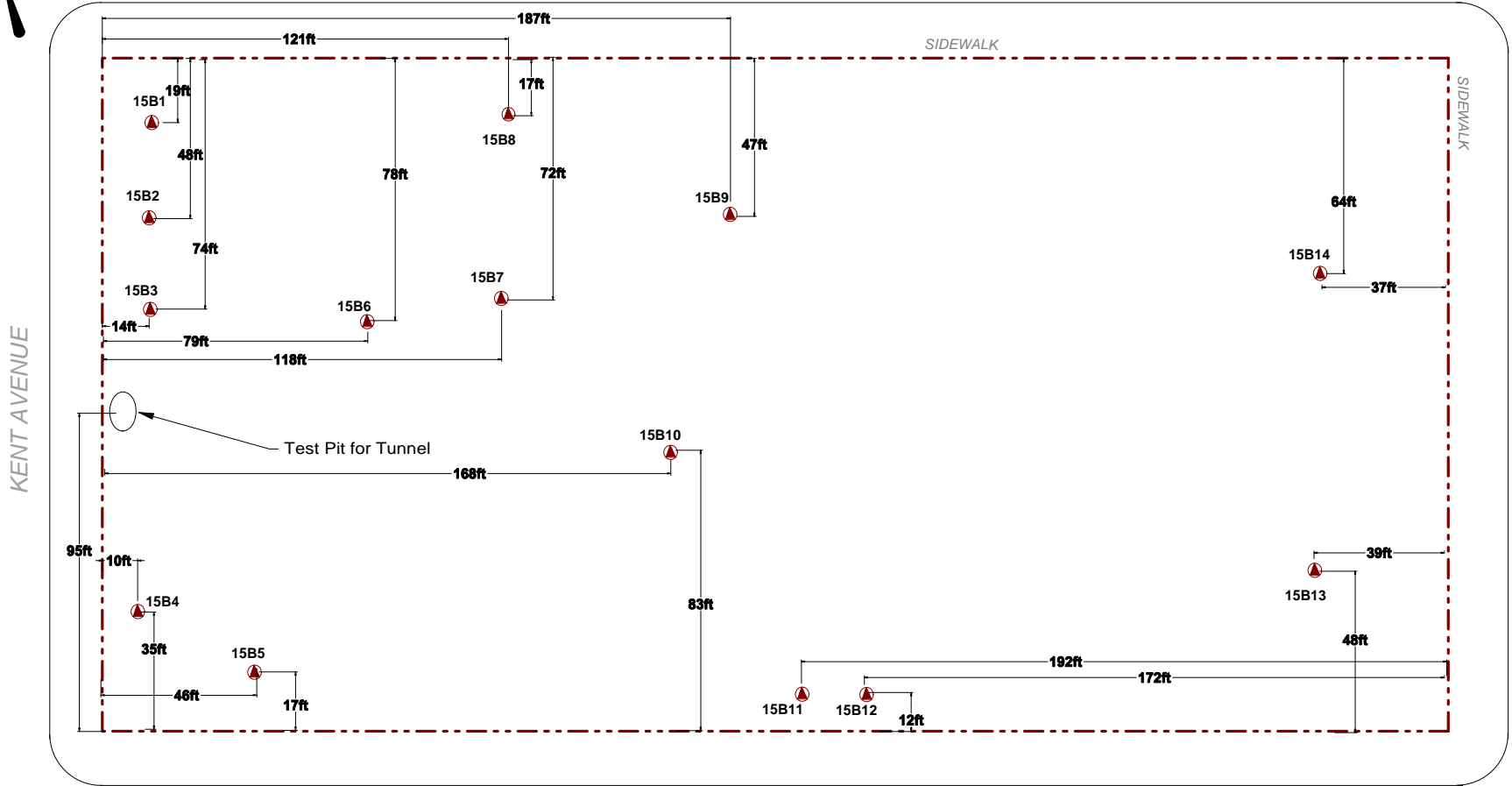
**FORMER SUNBELT EQUIPMENT**  
**25 KENT AVENUE, BROOKLYN, NY**

**FIGURE 1**      **SITE LOCATION MAP**



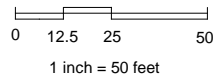


NORTH 13th STREET



NORTH 12th STREET

SCALE



KEY:

- Site Boundary
- ▲ 15Bx Soil Boring Location

**ABC**  
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Figure No.  
**2**

Site Name: **FORMER SUNBELT EQUIPMENT SITE**

Site Address: **25 KENT AVENUE, BROOKLYN, NY 11249**

Drawing Title: **SOIL BORING AND TEST PIT LOCATION**

# *COMMUNITY AIR MONITORING* *PLAN*



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COMMUNITY AIR MONITORING PLAN

FORMER SUNBELT EQUIPMENT SITE  
25 KENT AVENUE  
BROOKLYN, NY

MAY - 2015

**COMMUNITY AIR MONITORING PLAN  
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Appendix A    Action Limit Report

## 1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for the excavation and building activities to be performed under a Supplemental Investigation at the Former Sunbelt Equipment Site. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the investigation activities) from potential airborne contaminant releases resulting from investigative activities at the site.

Compliance with this CAMP is required during all activities associated with the investigation that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include drilling, advancing soil borings, advancing test pits and collecting samples. This CAMP has been prepared to ensure that soil disturbance activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of construction-related contaminants to offsite areas.

### 1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;

## **2.0 AIR MONITORING**

VOCs, SVOCs and heavy metals and are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during soil disturbance activities is through real-time VOC and air particulate (dust) monitoring.

### **2.1 Meteorological Data**

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

### **2.2 Community Air Monitoring Requirements**

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before activities begin. These points will be monitored periodically in series during the site work. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), minirae 2000, or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan



### 3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

#### 3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during investigation activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- Collection of purge water in covered containers;
- storage of excess sample and drill cuttings in drums or covering with plastic

## 4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during drilling activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns (PM<sub>10</sub>) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter (µg/m<sup>3</sup>). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 µg/m<sup>3</sup> above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 150 µg/m<sup>3</sup> for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 100 µg/m<sup>3</sup> above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 100 µg/m<sup>3</sup> above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 100 µg/m<sup>3</sup> of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

### 4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 µg/m<sup>3</sup> at any time during drilling activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- Placement of drill cuttings in drums or covering stockpiles with plastic;
- Misting of the drilling area with a fine water spray from a hand-held spray bottle

Work may continue with dust suppression techniques provided that downwind PM<sub>10</sub> levels are not more than 150 µg/m<sup>3</sup> greater than the upwind levels.

There may also be situations where the dust is generated by drilling activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below  $150 \mu\text{g}/\text{m}^3$ , or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

## **5.0 DATA QUALITY ASSURANCE**

### **5.1 Calibration**

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

### **5.2 Operations**

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

### **5.3 Data Review**

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.



## 6.0 RECORDS AND REPORTING

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.

**APPENDIX A**  
**ACTION LIMIT REPORT**

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# **HEALTH AND SAFETY PLAN**



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# FORMER SUNBELT EQUIPMENT

25 KENT AVENUE  
BROOKLYN, NEW YORK  
Block 2282 Lot 1

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## HEALTH AND SAFETY PLAN

MAY 2015

*Prepared for:*  
19 Kent Development LLC  
199 Lee Avenue # 693  
Brooklyn, NY 11211

*Prepared by:*

**EBC**

**ENVIRONMENTAL BUSINESS CONSULTANTS**

1808 Middle Country Road  
Ridge, NY 11961

# HEALTH AND SAFETY PLAN

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### ***APPENDICES***

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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:

Name	Title	Address	Contact Numbers
Mr. Kevin Brussee	EBC Project Manager	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 (631) 338-1749
Mr. Kevin Waters	Site Safety Officer	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 (516) 287-9023
Mr. Elbio Cruz	C2 Environmental Equipment Operator	99 Jericho Turnpike Jericho, NY	(516) 417-8588

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 Phase II Subsurface Investigation is being conducted at the site to identify and characterize potential contaminants within the surface/subsurface soils at the site.

The results from this investigation will help determine what actions may be required, if any, to control odors during future excavation activities at the site. The work will be conducted in accordance with the procedures as specified in the supplemental investigation work plan.

### **2.1 Phase I Environmental Site Assessment**

The subsurface investigation will include the installation of soil borings and test pits. Site sampling locations are shown on **Figure 2** of the Supplemental 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).

### **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

Urban fill, present throughout the New York City area, typically contain 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 findings of the Phase I and use of adjacent properties, and the inherent properties of urban fill, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs) related to spills of petroleum fuels or industrial solvents, semi-volatile organic compounds (SVOCs) related to petroleum fuel spills or inherent in historic fill, pesticides related to historic use of the site, polychlorinated biophenyl's (PCBs), and heavy metals such as arsenic, chromium, lead and mercury related to historic fill materials.

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 5,000  $\mu\text{g}/\text{m}^3$  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.

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

## 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;
- 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;
- 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  $\mu\text{g}/\text{m}^3$  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
Woodhull Medical Center	1-718-963-8000
NYSDEC Spills Division	1-800-457-7362
NYSDEC Hazardous Waste Division	1-718-482-4994
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                      Mr. Kevin Brussee (631) 504-6000
- Site Safety Officer                      Mr. Kevin Waters (631) 504-6000
- Alternate                                  Mr. Greg Swirson (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 DEC regional office;
- 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...):

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

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3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

***APPENDIX B***  
***SITE SAFETY PLAN AMENDMENTS***

**SITE SAFETY PLAN AMENDMENT FORM**

Site Safety Plan Amendment #: \_\_\_\_\_

Site Name: \_\_\_\_\_

Reason for Amendment: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Alternative Procedures: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Required Changes in PPE: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Project Superintendent (signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Health and Safety Consultant (signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Site Safety Officer (signature)

\_\_\_\_\_  
Date

# ***APPENDIX C***

## ***CHEMICAL HAZARDS***

### **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.

# International Chemical Safety Cards

1,2,4-TRIMETHYLBENZENE

ICSC: 1433



Pseudocumene  
 $C_9H_{12}$   
 Molecular mass: 120,2

ICSC # 1433  
 CAS # 95-63-6  
 RTECS # [DC3325000](#)  
 UN # 1993  
 EC # 601-043-00-3  
 March 06, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
<b>EXPLOSION</b>	Above 44°C explosive vapour/air mixtures may be formed.	Above 44°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness. Dry skin.	Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	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**

ICSC: 1433

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

## 1,2,4-TRIMETHYLBENZENE

ICSC: 1433

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic and irritating fumes Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (as mixed isomers) 25 ppm as TWA (ACGIH 2004). MAK: (as mixed isomers) 20 ppm 100 mg/m<sup>3</sup> Peak limitation category: II(2) Pregnancy risk group: C (DFG 2004). OSHA PEL<sup>†</sup>: none NIOSH REL: TWA 25 ppm (125 mg/m<sup>3</sup>) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> 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.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>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</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 44°C c.c. Auto-ignition temperature: 500°C Explosive limits, vol% in air: 0.9-6.4 Octanol/water partition coefficient as log Pow: 3.8</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</p>	
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### 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 Trimethylbenzene (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

<b>ICSC: 1433</b>	<b>1,2,4-TRIMETHYLBENZENE</b>
<small>(C) IPCS, CEC, 1994</small>	

<b>IMPORTANT LEGAL NOTICE:</b>	<p>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.</p>
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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



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
<b>EXPLOSION</b>	Above 50°C explosive vapour/air mixtures may be formed.	Above 50°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
<b>•INHALATION</b>	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Redness. Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>•EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.)	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	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**

**ICSC: 1155**

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

ICSC: 1155

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as mixed isomers): 25 ppm; (ACGIH 2001). MAK (all isomers): 20 ppm; 100 mg/m<sup>3</sup>; class II 1 © (2001) OSHA PEL<sup>†</sup>: none NIOSH REL: TWA 25 ppm (125 mg/m<sup>3</sup>) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> 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.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>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</p>	<p>Relative vapour density (air = 1): 4.1 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 50°C (c.c.) Auto-ignition temperature: 550°C Octanol/water partition coefficient as log Pow: 3.42</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is harmful to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</p>	
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### NOTES

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).

Transport Emergency Card: TEC (R)-30S2325  
NFPA Code: H0; F2; R0

### ADDITIONAL INFORMATION

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<b>ICSC: 1155</b>	(C) IPCS, CEC, 1994	<b>1,3,5-TRIMETHYLBENZENE</b>
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<b>IMPORTANT LEGAL NOTICE:</b>	<p>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.</p>
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# International Chemical Safety Cards

**BENZENE**

ICSC: 0015



Cyclohexatriene  
Benzol  
C<sub>6</sub>H<sub>6</sub>  
Molecular mass: 78.1

ICSC # 0015  
CAS # 71-43-2  
RTECS # [CY1400000](#)  
UN # 1114  
EC # 601-020-00-8  
May 06, 2003 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers.	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).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	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.
<b>•EYES</b>	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.
<b>•INGESTION</b>	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	STORAGE	PACKAGING & LABELLING
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.	Fireproof. Separated from food and feedstuffs oxidants halogens	Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0015**

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

**BENZENE**

ICSC: 0015

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> 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.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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 <a href="#">See Appendix F</a> NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 ppm See: <a href="#">71432</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation through the skin and by ingestion</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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 , resulting in lowering of consciousness Exposure far above the occupational exposure limit value may result in unconsciousness death</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the bone marrow immune system , resulting in a decrease of blood cells. This substance is carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms.</p>	
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**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**

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**ICSC: 0015** **BENZENE**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**ETHYLBENZENE**

ICSC: 0268



Ethylbenzol  
Phenylethane  
EB  
 $C_8H_{10} / C_6H_5C_2H_5$   
Molecular mass: 106.2

ICSC # 0268  
CAS # 100-41-4  
RTECS # [DA0700000](#)  
UN # 1175  
EC # 601-023-00-4  
March 13, 1995 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	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.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Cough. Dizziness. Drowsiness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain. Blurred vision.	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.
• <b>INGESTION</b>	(Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking liquid in covered containers. 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.	Fireproof. Separated from strong oxidants.	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**

**ICSC: 0268**

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

## ETHYLBENZENE

ICSC: 0268

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID, WITH AROMATIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are easily formed.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong oxidants. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 3A; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 125 ppm (545 mg/m<sup>3</sup>) NIOSH IDLH: 800 ppm 10%LEL See: <a href="#">100414</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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 far above the OEL could cause lowering of consciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 18°C c.c. Auto-ignition temperature: 432°C Explosive limits, vol% in air: 1.0-6.7 Octanol/water partition coefficient as log Pow: 3.2</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is harmful to aquatic organisms.</p>	
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**NOTES**

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1175 or 30GF1-I+II  
NFPA Code: H2; F3; R0

**ADDITIONAL INFORMATION**

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**ICSC: 0268** **ETHYLBENZENE**

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<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# 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  
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

CAS#	Chemical Name	Percent	EINECS/ELINCS
104-51-8	n-Butylbenzene	>99	203-209-7

### 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:** .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 tightly closed container. 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

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Butylbenzene	none listed	none listed	none listed

**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



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.

## Section 9 - Physical and Chemical Properties

**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:** .8600g/cm<sup>3</sup>

**Molecular Formula:** C<sub>10</sub>H<sub>14</sub>

**Molecular Weight:** 134.22

## Section 10 - Stability and Reactivity

**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.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 104-51-8: CY9070000

**LD50/LC50:**

Not available.

**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:**

## Section 12 - Ecological Information

**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

	US DOT	Canada TDG
<b>Shipping Name:</b>	BUTYL BENZENES	No information available.
<b>Hazard Class:</b>	3	
<b>UN Number:</b>	UN2709	
<b>Packing Group:</b>	III	

## 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.  
H335 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.

**Ingestion**

Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.

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**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : 1-Phenylpropane  
Formula : C<sub>9</sub>H<sub>12</sub>  
Molecular Weight : 120.19 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Propylbenzene</b>			
103-65-1	203-132-9	601-024-00-X	-

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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**

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.

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**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.

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**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.

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**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.

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### 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.

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### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### Appearance

Form	liquid, clear
Colour	colourless

#### Safety data

pH	no data available
Melting point	-99 °C (-146 °F) - lit.
Boiling point	159 °C (318 °F) - lit.
Flash point	42.0 °C (107.6 °F) - closed cup
Ignition temperature	450 °C (842 °F)
Lower explosion limit	0.8 %(V)
Upper explosion limit	6 %(V)
Density	0.862 g/cm <sup>3</sup> at 25 °C (77 °F)
Water solubility	slightly soluble

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### 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

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**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Oral - rat - 6,040 mg/kg

Remarks: Behavioral:Somnolence (general depressed activity).

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**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	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

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**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 1.55 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates. Immobilization EC50 - Daphnia magna (Water flea) - 2 mg/l - 24 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.

Avoid release to the environment.

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**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.

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**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: PROPYLBENZENE  
Marine pollutant: No

**IATA**

UN-Number: 2364 Class: 3 Packing group: III  
Proper shipping name: n-Propylbenzene

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**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
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**Pennsylvania Right To Know Components**

Propylbenzene	CAS-No. 103-65-1	Revision Date 2007-03-01
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**New Jersey Right To Know Components**

Propylbenzene	CAS-No. 103-65-1	Revision Date 2007-03-01
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**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.

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**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.

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# International Chemical Safety Cards

**o-XYLENE**

ICSC: 0084



ortho-Xylene  
 1,2-Dimethylbenzene  
 o-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
 Molecular mass: 106.2

ICSC # 0084  
 CAS # 95-47-6  
 RTECS # [ZE2450000](#)  
 UN # 1307  
 EC # 601-022-00-9  
 August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 32°C explosive vapour/air mixtures may be formed.	Above 32°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	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	STORAGE	PACKAGING & LABELLING
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.)	Fireproof. Separated from strong oxidants and strong acids .	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**

**ICSC: 0084**

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

**o-XYLENE**

**ICSC: 0084**

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids and strong oxidants .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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<sup>†</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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**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**

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<b>ICSC: 0084</b>	<b>o-XYLENE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL</b></p>	<p>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</p>
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# International Chemical Safety Cards

p-XYLENE

ICSC: 0086



para-Xylene  
1,4-Dimethylbenzene  
p-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
Molecular mass: 106.2

ICSC # 0086  
CAS # 106-42-3  
RTECS # [ZE2625000](#)  
UN # 1307  
EC # 601-022-00-9  
August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	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	STORAGE	PACKAGING & LABELLING
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.)	Fireproof. Separated from strong oxidants, strong acids	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**

**ICSC: 0086**

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-XYLENE**

ICSC: 0086

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m<sup>3</sup> 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<sup>±</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>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: 528°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.15</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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## 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

<p><b>ICSC: 0086</b></p>	<p><b>p-XYLENE</b></p>
<p>(C) IPCS, CEC, 1994</p>	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

m-XYLENE

ICSC: 0085



meta-Xylene  
1,3-Dimethylbenzene  
m-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
Molecular mass: 106.2

ICSC # 0085  
CAS # 108-38-3  
RTECS # [ZE2275000](#)  
UN # 1307  
EC # 601-022-00-9  
August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	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	STORAGE	PACKAGING & LABELLING
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.)	Fireproof. Separated from strong oxidants strong acids	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**

ICSC: 0085

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

**m-XYLENE**

**ICSC: 0085**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m<sup>3</sup> 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<sup>±</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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**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.

NFA Code: H 2; F 3; R 0;  
Transport Emergency Card: TEC (R)-30S1307-III

**ADDITIONAL INFORMATION**

<b>ICSC: 0085</b>	<b>m-XYLENE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**p-CYMENE**

ICSC: 0617



1-Methyl-4-isopropylbenzene  
 Dolcymene  
 Camphogen  
 $C_{10}H_{14} / CH_3C_6H_4CH(CH_3)_2$   
 Molecular mass: 134.2

ICSC # 0617  
 CAS # 99-87-6  
 RTECS # [GZ5950000](#)  
 UN # 2046  
 November 04, 1997 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 47°C explosive vapour/air mixtures may be formed.	Above 47°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
<b>•INHALATION</b>	Dizziness. Drowsiness. Vomiting.	Ventilation.	Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Wear protective gloves when administering first aid.
<b>•EYES</b>	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Diarrhoea. Drowsiness. Headache. Nausea. Vomiting. Unconsciousness.	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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).	Fireproof.	UN Hazard Class: 3 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0617**

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-CYMENE

ICSC: 0617

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with oxidants. Attacks rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour and by ingestion.</p> <p><b>INHALATION RISK:</b> 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.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	
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**NOTES**

<p>Transport Emergency Card: TEC (R)-30G35</p> <p>NFPA Code: H2; F2; R0;</p>
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**ADDITIONAL INFORMATION**

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<p>ICSC: 0617</p>	<p>p-CYMENE</p>
<p>(C) IPCS, CEC, 1994</p>	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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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

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**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.

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**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : 2-Phenylbutane

Formula : C<sub>10</sub>H<sub>14</sub>  
Molecular Weight : 134.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>sec-Butylbenzene</b>			
135-98-8	205-227-0	-	-

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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

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.

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#### 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.

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#### 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.

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#### 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.

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## 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

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## 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

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## 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**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	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

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**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.

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### 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.

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### 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

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### 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
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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

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	Revision Date
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#### New Jersey Right To Know Components

sec-Butylbenzene	CAS-No. 135-98-8	Revision Date
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#### 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.

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### 16. OTHER INFORMATION

**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<sub>10</sub>H<sub>14</sub>  
Molecular Weight : 134.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>tert-Butylbenzene</b>			
98-06-6	202-632-4	-	-

**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/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	-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: n-octanol/water	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

Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands.

**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**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.
<b>Ingestion</b>	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

	CAS-No.	Revision Date
tert-Butylbenzene	98-06-6	1993-04-24

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
tert-Butylbenzene	98-06-6	1993-04-24

**New Jersey Right To Know Components**

tert-Butylbenzene

CAS-No.  
98-06-6

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, or any other reproductive defects.

**16. OTHER INFORMATION**

**Further information**

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# International Chemical Safety Cards

## TETRACHLOROETHYLENE

ICSC: 0076



1,1,2,2-Tetrachloroethylene  
 Perchloroethylene  
 Tetrachloroethene  
 $C_2Cl_4 / Cl_2C=CCl_2$   
 Molecular mass: 165.8

ICSC # 0076  
 CAS # 127-18-4  
 RTECS # [KX3850000](#)  
 UN # 1897  
 EC # 602-028-00-4  
 April 13, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	Safety goggles , face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Separated from metals ,( see Chemical Dangers ), food and feedstuffs . Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0076**

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

## TETRACHLOROETHYLENE

ICSC: 0076

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air.</p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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<sup>+</sup>: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours) NIOSH REL: Ca Minimize workplace exposure concentrations. <a href="#">See Appendix A</a> NIOSH IDLH: Ca 150 ppm See: <a href="#">127184</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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. Exposure at high levels may result in unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
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### 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

<p><b>ICSC: 0076</b></p>	<p><b>TETRACHLOROETHYLENE</b></p>
<p>(C) IPCS, CEC, 1994</p>	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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</p>
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# International Chemical Safety Cards

**TOLUENE**

ICSC: 0078



Methylbenzene  
Toluol  
Phenylmethane  
 $C_6H_5CH_3 / C_7H_8$   
Molecular mass: 92.1

ICSC # 0078  
CAS # 108-88-3  
RTECS # [XS5250000](#)  
UN # 1294  
EC # 601-021-00-3  
October 10, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	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.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	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	STORAGE	PACKAGING & LABELLING
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	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II



## SEE IMPORTANT INFORMATION ON BACK

ICSC: 0078

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

TOLUENE

ICSC: 0078

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 50 ppm 190 mg/m<sup>3</sup> H Peak limitation category: II(4) Pregnancy risk group: C (DFG 2004). OSHA PEL<sup>†</sup>: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) NIOSH REL: TWA 100 ppm (375 mg/m<sup>3</sup>) ST 150 ppm (560 mg/m<sup>3</sup>) NIOSH IDLH: 500 ppm See: <a href="#">108883</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<b>PHYSICAL PROPERTIES</b>	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	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 4°C c.c. Auto-ignition temperature: 480°C Explosive limits, vol% in air: 1.1-7.1 Octanol/water partition coefficient as log Pow: 2.69
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<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms.	
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## 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

TOLUENE

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081



1,1,2-Trichloroethylene  
Trichloroethene  
Ethylene trichloride  
Acetylene trichloride  
 $C_2HCl_3$  /  $CICH=CCl_2$   
Molecular mass: 131.4

ICSC # 0081  
CAS # 79-01-6  
RTECS # [KX4550000](#)  
UN # 1710  
EC # 602-027-00-9  
April 10, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	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.
• <b>INGESTION</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	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.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 45-36/38-52/53-67 S: 53-45-61 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 European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the



ICSC: 0081

OSHA PELs, NIOSH RELs and NIOSH IDLH values.


# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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<sup>†</sup>: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours) NIOSH REL: Ca <a href="#">See Appendix A</a> <a href="#">See Appendix C</a> NIOSH IDLH: Ca 1000 ppm See: <a href="#">79016</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>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 density (air = 1): 4.5</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
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### 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.

### ADDITIONAL INFORMATION

### 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 + 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: 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**  
**Ingestion**

Causes eye irritation.  
Harmful if swallowed.

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>14</sub>H<sub>10</sub>  
Molecular Weight : 178.23 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Phenanthrene</b>			
85-01-8	201-581-5	-	-

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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**

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.

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### 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.

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### 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.

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### 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.

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### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

Components	CAS-No.	Value	Control	Update	Basis
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			parameters		
Phenanthrene	85-01-8	TWA	0.2 mg/m <sup>3</sup>	1993-06-30	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m <sup>3</sup>	1989-03-01	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

### 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.

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## 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

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## 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

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## 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**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	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**

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**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 3.2 mg/l - 96.0 h LC100 - other fish - 1.5 mg/l - 1.0 h
Toxicity to daphnia	EC50 - Daphnia magna (Water flea) - 0.86 mg/l - 24 h

and other aquatic invertebrates.

EC50 - Daphnia magna (Water flea) - 0.38 mg/l - 48 h

Toxicity to algae EC50 - Chlorella vulgaris (Fresh water algae) - 1.20 mg/l - 3 h

#### **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.

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### **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.

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### **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  
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. (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.

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### **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**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Phenanthrene	85-01-8	1990-01-01

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**16. OTHER INFORMATION****Further information**

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Fluorene	
Product Number	:	46880	
Brand	:	Aldrich	
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

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.

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>13</sub>H<sub>10</sub>  
Molecular Weight : 166.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Fluorene</b>			
86-73-7	201-695-5	-	-

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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.

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### 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

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### 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.

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### 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

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

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

#### 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**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	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

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**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
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**

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Fluorene	86-73-7	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.

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Fluoranthene

Product Number : 423947  
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

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

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Skin</b>	Harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.
<b>Ingestion</b>	Harmful if swallowed.

---

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Benzo[j,k]fluorene

Formula : C<sub>16</sub>H<sub>10</sub>

Molecular Weight : 202.25 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Fluoranthene</b>			
206-44-0	205-912-4	-	-

---

## 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



Odour Threshold no data available

Evaporation rate no data available

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## 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)

Reasonably anticipated to be a human carcinogen (Fluoranthene)

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

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	Harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	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.

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. (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:

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Fluoranthene	206-44-0	1990-01-01

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### 16. OTHER INFORMATION

#### Further information

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### 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 + 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: 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

Formula : C<sub>12</sub>H<sub>8</sub>  
Molecular Weight : 152.19 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Acenaphthylene</b>			
208-96-8	205-917-1	-	-

---

#### 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

Remarks: Autonomic Nervous System:Other (direct) parasympathomimetic. Respiratory disorder Blood: Hemorrhage.

**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**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	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: AB1254000

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**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

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**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
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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**

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**

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

## ACENAPHTHENE

ICSC: 1674



1,2-Dihydroacenaphthylene  
 1,8-Ethylenenaphthalene  
 $C_{12}H_{10}$   
 Molecular mass: 154.2

ICSC # 1674  
 CAS # 83-32-9  
 RTECS # [AB1000000](#)  
 UN # 3077  
 October 12, 2006 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See NOTES.	PREVENT DISPERSION OF DUST!	
<b>•INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>•SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Separated from strong oxidants . Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	UN Hazard Class: 9 UN Packing Group: III Signal: Warning Enviro Very toxic to aquatic life with long lasting effects

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1674**

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

**ACENAPHTHENE**

**ICSC: 1674**

<p><b>I M P O R T A N T A C T I V E</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE TO BEIGE CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic gases including carbon monoxide. Reacts with strong oxidants .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed .</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> See Notes.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 279°C Melting point: 95°C Density: 1.2 g/cm<sup>3</sup> Solubility in water, g/100 ml at 25°C: 0.0004</p>	<p>Vapour pressure, Pa at 25°C: 0.3 Relative vapour density (air = 1): 5.3 Flash point: 135°C o.c. Auto-ignition temperature: &gt;450 °C Octanol/water partition coefficient as log Pow: 3.9 - 4.5</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
<p><b>NOTES</b></p>		
<p>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.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM7-III</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
<p> </p>		
<p><b>ICSC: 1674</b></p>		<p><b>ACENAPHTHENE</b></p>



# International Chemical Safety Cards

**PYRENE**

ICSC: 1474



Benzo (d,e,f) phenanthrene  
beta-Pyrene  
 $C_{16}H_{10}$   
Molecular mass: 202.26

ICSC # 1474  
CAS # 129-00-0  
RTECS # [UR2450000](#)  
November 27, 2003 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Water spray, carbon dioxide, dry powder, alcohol-resistant foam, foam.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>			
• <b>INHALATION</b>		Avoid inhalation of dust	Fresh air, rest.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.)	Separated from strong oxidants. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. R: S:

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 1474

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

**PYRENE**

ICSC: 1474

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW COLOURLESS SOLID IN VARIOUS FORMS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation through the skin and by ingestion
<b>M</b>		

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D  
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A

**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**

Boiling point: 404°C  
Melting point: 151°C  
Density: 1.27 g/cm<sup>3</sup>

Solubility in water: 0.135 mg/l at 25°C  
Vapour pressure, Pa at °C: 0.08  
Octanol/water partition coefficient as log Pow: 4.88

**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**

**PYRENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**INDENO(1,2,3-cd)PYRENE**

ICSC: 0730



o-Phenylenepyrene  
2,3-Phenylenepyrene  
 $C_{22}H_{12}$   
Molecular mass: 276.3

ICSC # 0730  
CAS # 193-39-5  
RTECS # [NK9300000](#)  
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

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

**INDENO(1,2,3-cd)PYRENE**

ICSC: 0730

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b>
<b>P</b>		

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A

**CHEMICAL DANGERS:**  
Upon heating, toxic fumes are formed.

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**OCCUPATIONAL EXPOSURE LIMITS:**  
TLV not established.  
MAK:  
Carcinogen category: 2;  
(DFG 2004).

**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/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0730**

**INDENO(1,2,3-cd)PYRENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**DIBENZO(a,h)ANTHRACENE**

ICSC: 0431



1,25,6-Dibenzanthracene  
 $C_{22}H_{14}$   
 Molecular mass: 278.4

ICSC # 0431  
 CAS # 53-70-3  
 RTECS # [HN2625000](#)  
 EC # 601-041-00-2  
 October 23, 1995 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	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.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0431**

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

**DIBENZO(a,h)ANTHRACENE**

ICSC: 0431

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALLINE POWDER.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration
<b>P</b>		
<b>O</b>		



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A

**CHEMICAL DANGERS:**

of airborne particles can, however, be reached quickly.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

**EFFECTS OF SHORT-TERM EXPOSURE:**

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

The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 524°C  
Melting point: 267°C  
Relative density (water = 1): 1.28

Solubility in water:  
none  
Octanol/water partition coefficient as log Pow: 6.5

**ENVIRONMENTAL DATA**

Bioaccumulation of this chemical may occur in seafood.



**NOTES**

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).

**ADDITIONAL INFORMATION**

**ICSC: 0431**

**DIBENZO(a,h)ANTHRACENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**CHRYSENE**

ICSC: 1672



Benzoaphenanthrene  
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	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	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	STORAGE	PACKAGING & LABELLING
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.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	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

ICSC: 1672

<p><b>I M P O R T A N T  D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm<sup>3</sup></p>	<p>Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
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**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**

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ICSC: 1672

CHRYSENE

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**BENZO(k)FLUORANTHENE**

ICSC: 0721



Dibenzo(b,jk)fluorene  
8,9-Benzofluoranthene  
11,12-Benzofluoranthene  
 $C_{20}H_{12}$   
Molecular mass: 252.3

ICSC # 0721  
CAS # 207-08-9  
RTECS # [DF6350000](#)  
EC # 601-036-00-5  
March 25, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		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 spectacles 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.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0721**

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

**BENZO(k)FLUORANTHENE**

ICSC: 0721

I	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
M		

P  
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D  
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A

**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/m<sup>3</sup>. 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**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**BENZO(g,h,i)FLUORANTHENE**

ICSC: 0527



2,13-Benzofluoranthene  
Benzo(mno)fluoranthene  
 $C_{18}H_{10}$   
Molecular mass: 226.3

ICSC # 0527  
CAS # 203-12-3  
RTECS # [DF6140000](#)  
March 25, 1998 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	
• <b>SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• <b>EYES</b>		Safety goggles, 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.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	

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. Do NOT let this chemical enter the environment.	Well closed.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0527**

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

**BENZO(g,h,i)FLUORANTHENE**

ICSC: 0527

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>		
<b>P</b>	<b>PHYSICAL DANGERS:</b>	

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**INHALATION RISK:**

**CHEMICAL DANGERS:**

The substance decomposes on heating producing toxic fumes.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

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

See Notes.

**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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# International Chemical Safety Cards

**BENZO(b)FLUORANTHENE**

ICSC: 0720



Benz(e)acephenanthrylene  
 2,3-Benzofluoranthene  
 Benzo(e)fluoranthene  
 3,4-Benzofluoranthene  
 $C_{20}H_{12}$   
 Molecular mass: 252.3

ICSC # 0720  
 CAS # 205-99-2  
 RTECS # [CU1400000](#)  
 EC # 601-034-00-4  
 March 25, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0720**

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

**BENZO(b)FLUORANTHENE**

ICSC: 0720

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation
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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).

of its aerosol and through the skin.

**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/m<sup>3</sup>. 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

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**BENZO(a)PYRENE**

ICSC: 0104



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



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•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		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.


# International Chemical Safety Cards

# BENZO(a)PYRENE

ICSC: 0104

<p>I M P O R T A N T A D D I T I O N</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> PALE-YELLOW CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm<sup>3</sup></p>	<p>Solubility in water: none (&lt;0.1 g/100 ml) Vapour pressure : negligible Octanol/water partition coefficient as log Pow: 6.04</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
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**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**

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<b>ICSC: 0104</b>	(C) IPCS, CEC, 1994	<b>BENZO(a)PYRENE</b>
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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

ICSC # 0385  
CAS # 56-55-3  
RTECS # [CV9275000](#)  
EC # 601-033-00-9  
October 23, 1995 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0385

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

ICSC: 0385

# BENZ(a)ANTHRACENE

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b></p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2 (as pyrolysis product of organic materials) (DFG 2005).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is probably carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274 Solubility in water: none</p>	<p>Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>Bioaccumulation of this chemical may occur in seafood.</p>	
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## NOTES

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. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

## ADDITIONAL INFORMATION

**ICSC: 0385**

**BENZ(a)ANTHRACENE**

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# International Chemical Safety Cards

**ANTHRACENE**

ICSC: 0825



Anthracin  
Paranaphthalene  
 $C_{14}H_{10} / (C_6H_4CH)_2$   
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
<b>FIRE</b>	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	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.
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST!</b>	
<b>•INHALATION</b>	Cough. Sore throat.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	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.
<b>•INGESTION</b>	Abdominal pain.	Do not eat, drink, or smoke during work.	Rinse mouth. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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).	Separated from strong oxidants. Well closed.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0825**

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

**ANTHRACENE**

ICSC: 0825

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> WHITE CRYSTALS OR FLAKES.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by
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**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.

**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**

Boiling point: 342°C  
Melting point: 218°C  
Density: 1.25-1.28 g/cm<sup>3</sup>  
Solubility in water, g/100 ml at 20 °C: 0.00013  
Vapour pressure, Pa at 25°C: 0.08

Relative vapour density (air = 1): 6.15  
Flash point: 121°C  
Auto-ignition temperature: 538°C  
Explosive limits, vol% in air: 0.6-?  
Octanol/water partition coefficient as log Pow: 4.5 (calculated)

**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**

**ANTHRACENE**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**NAPHTHALENE**

ICSC: 0667



Naphthene  
C<sub>10</sub>H<sub>8</sub>

Molecular mass: 128.18

ICSC # 0667  
CAS # 91-20-3  
RTECS # QJ0525000  
UN # 1334 (solid); 2304 (molten)  
EC # 601-052-00-2  
April 21, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	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.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0667**

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

ICSC: 0667

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms irritating and toxic gases. Reacts with strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> 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<sup>†</sup>: TWA 10 ppm (50 mg/m<sup>3</sup>) NIOSH REL: TWA 10 ppm (50 mg/m<sup>3</sup>) ST 15 ppm (75 mg/m<sup>3</sup>) NIOSH IDLH: 250 ppm See: <a href="#">91203</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 218°C Sublimation slowly at room temperature Melting point: 80°C Density: 1.16 g/cm<sup>3</sup> Solubility in water, g/100 ml at 25°C: none</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
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**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**

<b>ICSC: 0667</b>	<b>NAPHTHALENE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

ARSENIC

ICSC: 0013



Grey arsenic  
As  
Atomic mass: 74.9

ICSC # 0013  
CAS # 7440-38-2  
RTECS # [CG0525000](#)  
UN # 1558  
EC # 033-001-00-X

October 18, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>•EYES</b>	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.
<b>•INGESTION</b>	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	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

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

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

**ARSENIC**

**ICSC: 0013**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.01 mg/m<sup>3</sup> 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/m<sup>3</sup> NIOSH REL: Ca C 0.002 mg/m<sup>3</sup> 15-minute <a href="#">See Appendix A</a> NIOSH IDLH: Ca 5 mg/m<sup>3</sup> (as As) See: <a href="#">7440382</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 613°C Density: 5.7 g/cm<sup>3</sup></p>	<p>Solubility in water: none</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.</p>	
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**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** **ARSENIC**

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**BARIUM SULFATE**

ICSC: 0827



Barium sulphate  
Blanc fixe  
Artificial barite  
BaSO<sub>4</sub>

Molecular mass: 233.43

ICSC # 0827

CAS # 7727-43-7

RTECS # [CR0600000](#)

October 20, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles.			R: S:
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0827</b>		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

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with aluminium powder.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 mg/m<sup>3</sup> as TWA; (ACGIH 2004). MAK: (Inhalable fraction) 4 mg/m<sup>3</sup>; (Respirable fraction) 1.5 mg/m<sup>3</sup>; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 15 mg/m<sup>3</sup> (total) TWA 5 mg/m<sup>3</sup> (resp) NIOSH REL: TWA 10 mg/m<sup>3</sup> (total) TWA 5 mg/m<sup>3</sup> (resp) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles, resulting in baritosis (a form of benign pneumoconiosis).</p>
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<b>PHYSICAL PROPERTIES</b>	Melting point (decomposes): 1600°C Density: 4.5 g/cm <sup>3</sup>	Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	
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### 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

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<b>ICSC: 0827</b>	<b>BARIUM SULFATE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

**CHROMIUM**

ICSC: 0029



Chrome  
Cr  
Atomic mass: 52.0  
(powder)

ICSC # 0029  
CAS # 7440-47-3  
RTECS # [GB4200000](#)  
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST!</b>	
• <b>INHALATION</b>	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0029**

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

**CHROMIUM**

ICSC: 0029

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> GREY POWDER	<b>ROUTES OF EXPOSURE:</b>
<b>M</b>	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.	<b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed.
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**CHEMICAL DANGERS:**

Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard.

**EFFECTS OF SHORT-TERM EXPOSURE:**

May cause mechanical irritation to the eyes and the respiratory tract.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m<sup>3</sup> as TWA A4 (ACGIH 2004).  
MAK not established.

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

OSHA PEL\*: TWA 1 mg/m<sup>3</sup> [See Appendix C](#) \*Note: The PEL also applies to insoluble chromium salts.

NIOSH REL: TWA 0.5 mg/m<sup>3</sup> [See Appendix C](#)

NIOSH IDLH: 250 mg/m<sup>3</sup> (as Cr) See: [7440473](#)

**PHYSICAL PROPERTIES**

Boiling point: 2642°C  
Melting point: 1900°C  
Density: 7.15 g/cm<sup>3</sup>

Solubility in water:  
none

**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**

**CHROMIUM**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**COPPER**

ICSC: 0240



Cu  
(powder)

ICSC # 0240  
CAS # 7440-50-8  
RTECS # [GL5325000](#)  
September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0240**

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

**COPPER**

ICSC: 0240

<p><b>I</b></p> <p><b>M</b></p> <p><b>P</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p>
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Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

**EFFECTS OF SHORT-TERM EXPOSURE:**  
Inhalation of fumes may cause metal fume fever. See Notes.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV: 0.2 mg/m<sup>3</sup> fume (ACGIH 1992-1993).  
TLV (as Cu, dusts & mists): 1 mg/m<sup>3</sup> (ACGIH 1992-1993).  
Intended change 0.1 mg/m<sup>3</sup>  
Inhal.,

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

Repeated or prolonged contact may cause skin sensitization.

A4 (not classifiable as a human carcinogen);  
MAK: 0.1 mg/m<sup>3</sup> (Inhalable fraction)  
Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005).  
OSHA PEL\*: TWA 1 mg/m<sup>3</sup> \*Note: The PEL also applies to other copper compounds (as Cu) except copper fume.  
NIOSH REL\*: TWA 1 mg/m<sup>3</sup> \*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.  
NIOSH IDLH: 100 mg/m<sup>3</sup> (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**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**LEAD**

ICSC: 0052



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	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.
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. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.		Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0052</b>		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><b>I M P O R T A N T T A D A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> 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/m<sup>3</sup> (EU 2002). OSHA PEL*: 1910.1025 TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The PEL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH REL*: TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The REL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH IDLH: 100 mg/m<sup>3</sup> (as Pb) See: <a href="#">7439921</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> 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.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 1740°C Melting point: 327.5°C	Density: 11.34 g/cm <sup>3</sup> Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.	
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**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**

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<b>ICSC: 0052</b>	<b>LEAD</b>
(C) IPCS, CEC, 1994	

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# International Chemical Safety Cards

**MERCURY**

ICSC: 0056



Quicksilver  
Liquid silver  
Hg  
Atomic mass: 200.6

ICSC # 0056  
CAS # 7439-97-6  
RTECS # [OV4550000](#)  
UN # 2809  
EC # 080-001-00-0  
April 22, 2004 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		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.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0056**

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# International Chemical Safety Cards

## MERCURY

ICSC: 0056

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.025 mg/m<sup>3</sup> as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m<sup>3</sup> Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL<sub>f</sub>: C 0.1 mg/m<sup>3</sup> NIOSH REL: Hg Vapor: TWA 0.05 mg/m<sup>3</sup> skin Other: C 0.1 mg/m<sup>3</sup> skin NIOSH IDLH: 10 mg/m<sup>3</sup> (as Hg) See: <a href="#">7439976</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> 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.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system 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.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none</p>	<p>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</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.</p>	
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### 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

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<b>ICSC: 0056</b>	(C) IPCS, CEC, 1994	<b>MERCURY</b>
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<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# International Chemical Safety Cards

NICKEL

ICSC: 0062



Ni  
Atomic mass: 58.7  
(powder)

ICSC # 0062  
CAS # 7440-02-0  
RTECS # [QR5950000](#)  
EC # 028-002-00-7  
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</b>	
• <b>INHALATION</b>	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0062**

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

NICKEL

ICSC: 0062

<b>I</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> SILVERY METALLIC SOLID IN VARIOUS FORMS.</p> <p><b>PHYSICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of the dust.</p>
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M  
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A

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/m<sup>3</sup> 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/m<sup>3</sup> \*Note: The PEL does not apply to Nickel carbonyl. NIOSH REL\*: Ca TWA 0.015 mg/m<sup>3</sup> [See Appendix A](#) \*Note: The REL does not apply to Nickel carbonyl. NIOSH IDLH: Ca 10 mg/m<sup>3</sup> (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/cm<sup>3</sup>

Solubility in water: none

**ENVIRONMENTAL DATA**

**NOTES**

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**

**NICKEL**

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# International Chemical Safety Cards

**ZINC POWDER**

ICSC: 1205



Blue powder  
Merrillite  
Zn  
Atomic mass: 65.4  
(powder)

ICSC # 1205  
CAS # 7440-66-6  
RTECS # [ZG8600000](#)  
UN # 1436 (zinc powder or dust)  
EC # 030-001-00-1  
October 24, 1994 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
<b>EXPLOSION</b>	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</b>	
• <b>INHALATION</b>	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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.	Fireproof. Separated from acids, bases oxidants Dry.	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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1205**

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

## ZINC POWDER

ICSC: 1205

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS GREY TO BLUE POWDER.</p> <p><b>PHYSICAL DANGERS:</b> 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.</p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Inhalation of fumes may cause metal fume fever. The effects may be delayed.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 907°C Melting point: 419°C Relative density (water = 1): 7.14</p>	<p>Solubility in water: reaction Vapour pressure, kPa at 487°C: 0.1 Auto-ignition temperature: 460°C</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	
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### 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

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ICSC: 1205

ZINC POWDER

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

DDT

ICSC: 0034



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  
 $C_{14}H_9Cl_5$   
 Molecular mass: 354.5



ICSC # 0034  
 CAS # 50-29-3  
 RTECS # [KJ3325000](#)  
 UN # 2761  
 EC # 602-045-00-7  
 April 20, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
<b>•SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	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.
<b>•INGESTION</b>	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	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	STORAGE	PACKAGING & LABELLING
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.	Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0034

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

ICSC: 0034

DDT

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminium and iron.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1 mg/m<sup>3</sup> as TWA A3 (ACGIH 2004). MAK: 1 mg/m<sup>3</sup> H Peak limitation category: II(8) (DFG 2003). OSHA PEL: TWA 1 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 mg/m<sup>3</sup> See: <a href="#">50293</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> May cause mechanical irritation. The substance may cause effects on the central nervous system, resulting in convulsions and respiratory depression. Exposure at high levels may result in death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 260°C Melting point: 109°C Density: 1.6 g/cm<sup>3</sup></p>	<p>Solubility in water: poor Octanol/water partition coefficient as log Pow: 6.36</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
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### 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

<p><b>ICSC: 0034</b></p>	<p><b>DDT</b></p>
<p>(C) IPCS, CEC, 1994</p>	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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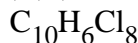
# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740



1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene  
1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene



Molecular mass: 409.8

ICSC # 0740  
CAS # 57-74-9  
RTECS #  
UN # 2996  
EC # 602-047-00-8  
March 26, 1998 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	(See Ingestion).	Breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	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.
<b>•INGESTION</b>	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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: chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol R: 21/22-40-50/53 S: 2-36/37-60-61 UN Hazard Class: 6.1 UN Packing Group: III

**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

<p><b>I M P O R T A N T A D V I S O R Y</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene hydrogen chloride Attacks iron, zinc, plastic, rubber and coatings.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: (Inhalable fraction) 0.5 mg/m<sup>3</sup> Peak limitation category: II(8); skin absorption (H); Carcinogen category: 3B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 100 mg/m<sup>3</sup> See: <a href="#">57749</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver immune system, resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point at 0.27kPa: 175°C Relative density (water = 1): 1.59-1.63 Solubility in water: none</p>	<p>Vapour pressure, Pa at 25°C: 0.0013 Octanol/water partition coefficient as log Pow: 2.78</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p>	
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### 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, Topiclör, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

### ADDITIONAL INFORMATION

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ICSC: 0740

CHLORDANE (TECHNICAL PRODUCT)

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>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.</p>
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# 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,2beta,2alpha,3beta,6beta,6alpha,7beta,7alpha)-2,7,3,6-  
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	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	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.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
<b>•INHALATION</b>	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	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.
<b>•EYES</b>		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.
<b>•INGESTION</b>	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
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).	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.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 25-27-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**




# International Chemical Safety Cards

DIELDRIN

ICSC: 0787

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> 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.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as TWA): 0.25 mg/m<sup>3</sup>, A4 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m<sup>3</sup> ; Peak limitation category: II(8) skin absorption (H); (DFG 2007). OSHA PEL: TWA 0.25 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.25 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 50 mg/m<sup>3</sup> See: <a href="#">60571</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system, resulting in convulsions. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</p>
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<b>PHYSICAL PROPERTIES</b>	Melting point: 175-176°C Density: 1.7 g/cm <sup>3</sup> Solubility in water: none	Vapour pressure, Pa at 20°C: 0.0004 Octanol/water partition coefficient as log Pow: 6.2
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<b>ENVIRONMENTAL DATA</b>	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.	
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## 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, Illoxol, 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

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ICSC: 0787

DIELDRIN

(C) IPCS, CEC, 1994

<b>IMPORTANT LEGAL NOTICE:</b>	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.
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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.

PROJECT NAME \_\_\_\_\_ PROJECT. NO. \_\_\_\_\_

Date of Accident \_\_\_\_\_ Time \_\_\_\_\_ Report By \_\_\_\_\_

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.)

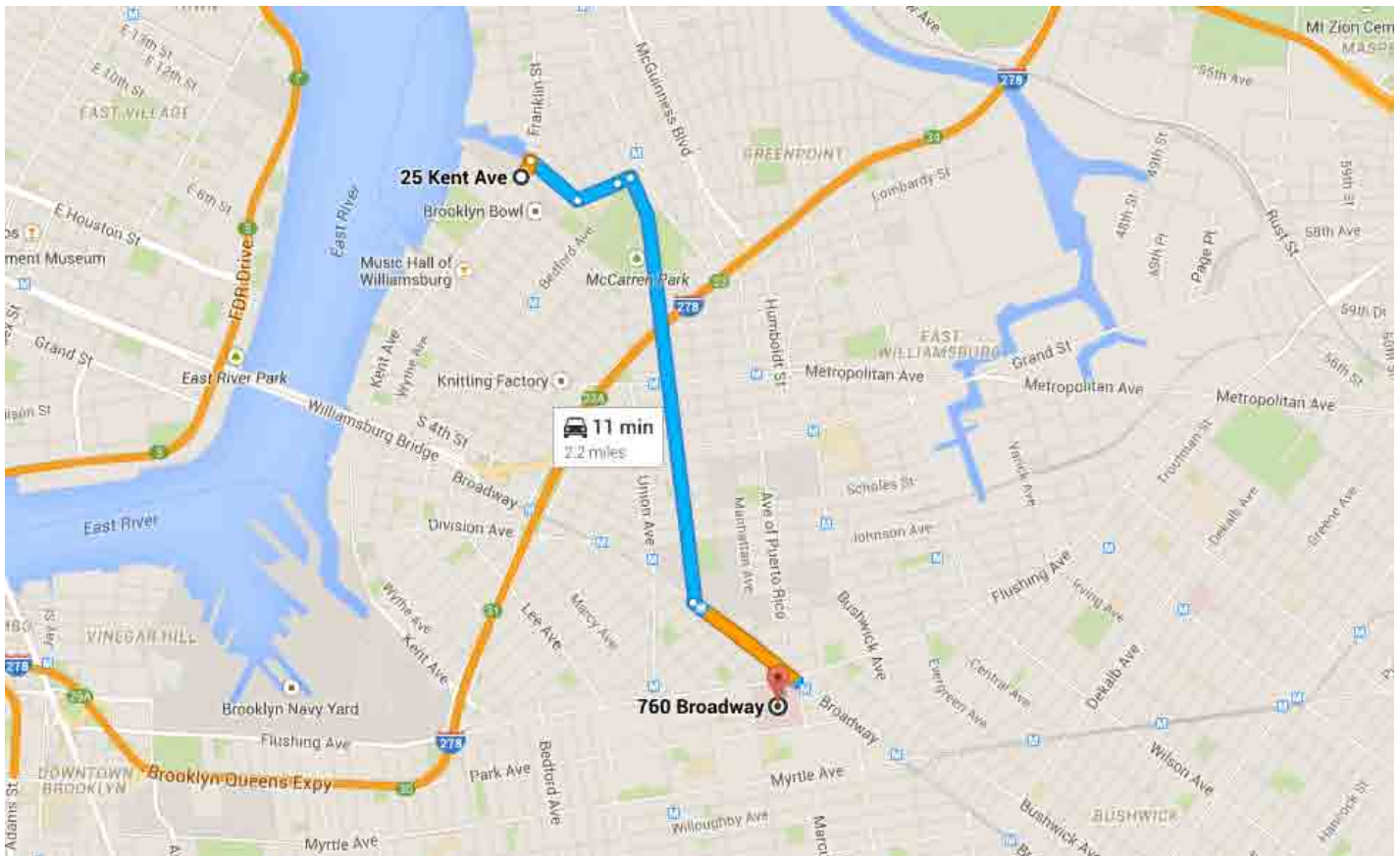
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

## HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

**WOODHUL MEDICAL CENTER**  
760 Broadway, Brooklyn, New York 11206  
718-963-8000  
2.2 Miles – About 11 Minutes

- 25 Kent Ave**  
Brooklyn, NY 11249
1. Head northeast on Kent Ave toward N 13th St  
338 ft
  2. Take the 2nd right onto N 14th St  
0.2 mi
  3. N 14th St turns left and becomes Nassau Ave  
0.1 mi
  4. Keep left to stay on Nassau Ave  
240 ft
  5. Turn right onto Lorimer St  
1.4 mi
  6. Turn left onto Broadway  
0.4 mi  
Destination will be on the right
- 760 Broadway**  
Brooklyn, NY 11206



The alternate hospital nearest the site is:

**BROOKLYN HOSPITAL CENTER**

121 DeKalb Avenue, Brooklyn, New York 11205

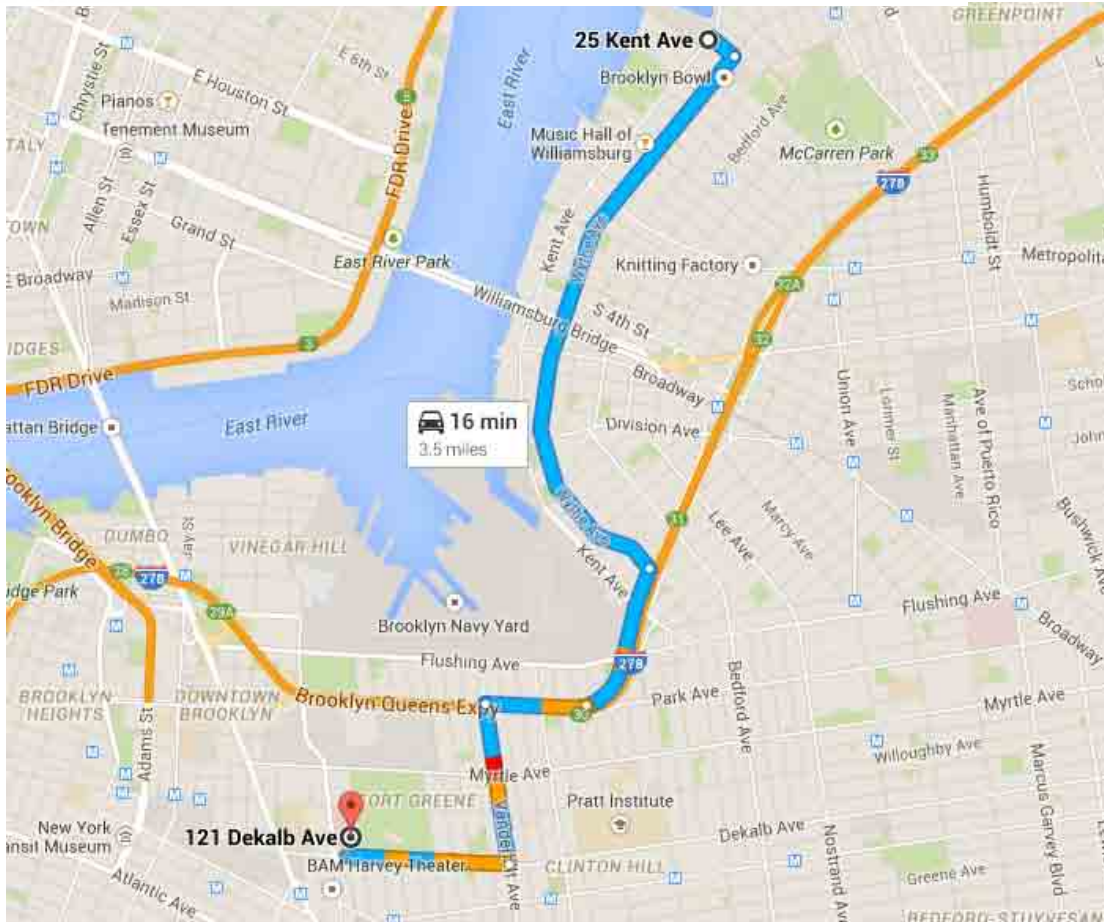
718-250-8000

3.5 Miles – About 16 Minutes

- ↑ 1. Head northeast on Kent Ave toward N 13th St 66 ft
  - ↘ 2. Take the 1st right onto N 13th St 453 ft
  - ↘ 3. Take the 1st right onto Wythe Ave 1.8 mi
  - ↘ 4. Turn right onto Williamsburg St W 0.4 mi
  - ↘ 5. Merge onto Park Ave 0.3 mi
  - ↙ 6. Turn left onto Vanderbilt Ave 0.5 mi
  - ↘ 7. Turn right at the 3rd cross street onto Dekalb Ave 0.5 mi
- 📍 Destination will be on the right

📍 **121 Dekalb Ave**

Brooklyn, NY 11201



**RESUMES OF PRINCIPAL PROJECT**  
**PERSONEL**



**ENVIRONMENTAL BUSINESS CONSULTANTS**

**1808 MIDDLE COUNTRY ROAD  
RIDGE, NY 11961**

**PHONE 631.504.6000  
FAX 631.924.2870**



**ENVIRONMENTAL BUSINESS CONSULTANTS**

## **Charles B. Sosik, PG, PHG, Principal**

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### **Professional Experience**

25 years

### **Education**

MS, Hydrogeology, Adelphi University, NY  
BS, Geology, Northern Arizona University, AZ

### **Areas of Expertise**

- Brownfields Redevelopment
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Remedial Planning and "Cost to Cure" Analysis
- Strategic Planning
- Real Estate Transactions
- NYC "E" Designations

### **Professional Certification**

- Professional Geologist, NH
- Professional Geologist, Hydrogeologist, WA
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor
- NYC OER Qualified Environmental Professional

### **Professional Affiliation / Committees**

- NYS Council of Professional Geologists (NYSCPG)
  - Association of Groundwater Scientists & Engineers (AGSE)
  - NYS RBCA Advisory Committee
  - Massachusetts LSP Association
  - New Hampshire Association of Professional Geologists
  - Interstate Technology Regulatory Council/MTBE Team
  - Environmental Business Association, Brownfields Task Force
  - Part 375 Working Group
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## **PROFILE**

Mr. Sosik has 25 years of experience in environmental consulting. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

For the past 10 years Mr. Sosik has been primarily engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

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## **SELECTED PROJECTS**

### **Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY**

**Water Treatment Plant EIS - Focused EIS** - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

### **Advanced Residential Communities, Rockville Centre, NY**

**Brownfield Project** – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to

advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

### **Former Temco Uniform site, West Haverstraw, NY**

**Brownfield Project** – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC's review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

### **Grovick Properties, Jackson Heights, NY**

**Brownfield Project** – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in

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## **Charles B. Sosik, PG, PHG, Principal**

purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

### **Metro Management, Bronx, NY**

**Brownfield Project** – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

The project was awarded the 2009 NYC Brownfield Award for Innovation.

### **Brandt Airflex, NY**

**Technical Consulting Services** - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

### **Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX**

**Jet Fuel Investigation** - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identified remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

### **KeySpan – Former LILCO Facilities, Various NY Locations**

**Pesticide Impact Evaluation** - Mr. Sosik developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well

data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vulnerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

### **Former Computer Circuits (Superfund) Site, Hauppauge, NY**

**CERCLA RI/FS** - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activities for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

### **Sun Oil, Seaford, NY**

**Remediation Consulting Services & Project Management** - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

### **Con Edison, Various Locations, NY**

**Hydrogeologic Consulting Services** - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

### **Keyspan - Tuthill Substation, Aqueboque, NY**

**Accelerated Site Characterization** - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbicide and its metabolites applied at utility sites in the 1980's. The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and efficient manner.

### **NYSDEC Spill, East Moriches, NY**

**Spill Release Analysis** - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by





## **Charles B. Sosik, PG, PHG, Principal**

the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

### **Minmilt Realty, Farmingdale, NY**

**Fate & Transport Modeling** - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

### **Sebonack Golf Course Project, Town of Southampton, NY**

**IPM Pesticide Study** - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

### **NYSDEC, Spills Division, Regions 1 - 4**

**Petroleum Spills Investigation & Remediation** - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

### **Sun Oil, E. Meadow, NY**

**Exposure Assessment** - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and

transport model to show that degradation processes would achieve standards within a reasonable time.

### **Sand & Gravel Mine, NY**

**Property Development** - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

### **NYSDEC, Mamaroneck, NY**

**Site Characterization / Source Identification** - In a complex hydrogeologic setting consisting of contaminant transport through fractured metamorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

### **Riverhead Municipal Water District, NY**

**Site Characterization / Remedial Planning** - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

### **Montauk Fire Department, NY**

**Site Assessment** - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a \$500,000, and rising, claim against the department by the water district and the NYSDEC.

## **PREVIOUS EXPERIENCE**

### **P.W. Grosser Consulting, Bohemia, NY**

Senior Project Manager, 1999-2006

### **Environmental Assessment & Remediation, Patchogue, NY**

Senior Project Manager, 1994-1999

### **Miller Environmental Group, Calverton, NY**

Project Manager, 1989-1994

### **DuPont Biosystems, Aston, PA**

Hydrogeologist, 1988-1989



Charles B. Sosik, PG, PHG, Principal

EXPERT WITNESS TESTIMONY AND DEPOSITIONS

Fact Witness -Testimony on relative age of petroleum spill based on nature and extent of residual and dissolved components at the Delta Service Station in Uniondale, NY Fall/1999

Expert Witness / Expert Report for defendant in cost recovery case by NYS Attorney General regarding a Class II Inactive Hazardous Waste (State Superfund) project by the NYSDEC (October 2004 – present, Report: March 2005, Deposition: April 2005, 2nd Report: Aug. 2013, 2nd Deposition Nov. 2013, Bench Trial: December 2013 - qualified as expert in Federal Court),

Expert Witness / Fact Witness for plaintiff seeking compensation for partial expenses incurred during the investigation and remediation of a USEPA CERCLA site due to the release and migration of contaminants from an "upgradient" industrial property. (Deposition May 2005, case settled April 2007).

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Holtzville, NY (Deposition April 2005 - case settled).

Expert Witness – Statement of opinion and expert testimony at trial for plaintiff seeking damages from a major oil corporation for contamination under a prior leasing agreement in Rego Park, NY. Case decided in favor of plaintiff. Trial July 2007, in favor of Plaintiff. Qualified as Expert.

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Lindenhurst, NY (Trial date Dec. 2009, in favor of plaintiff. Qualified as Expert State Supreme Court.

Expert Witness - for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Riverhead, NY. Case settled July 2008.

Expert Witness for plaintiffs in class action case with respect to damages from chlorinated plume impact to residences in Dayton, OH. (Draft Report – May 2013).

Expert Witness / Fact Witness for defendant with respect to cost recovery and third party responsibility for a NYSDEC petroleum spill site in Lindenhurst, NY (Expert Statement of Fact – October 2005).

Expert Witness for plaintiff seeking damages related to a petroleum spill from the previous owner/operator of a gas station in College Point, NY. Case settled 2009.

Expert Witness for plaintiff (municipal water supply purveyor) seeking damages from major oil companies and manufacturer of MTBE at various locations in Suffolk County, NY. Expert reports July 2007, August 2007 and October 2007, Case settled August, 2008.

Expert Witness - Deposition for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Sag Harbor, NY. August 2002

Expert Witness for defendant responding to a claim from adjacent commercial property owner on the origin of chlorinated solvents on plaintiff's property located in Cedarhurst, NY. Expert opinion submitted to lead counsel on March 6, 2009, case settled April 2009.

Expert Report - for Attorney General on modeling performed to determine the spill release scenario at a NYSDEC petroleum spill site in East Moriches, NY. June 2000.

Expert Witness - for plaintiff in case regarding impact to private wells from a spill at adjacent Town and County properties with open gasoline spill files in Goshen, NY. Expert report submitted August 2013.

Expert Witness for defendant with respect to cost recovery from Sunoco for a NYSDEC petroleum spill site. (Declaration – January 2013).

Expert Witness - for plaintiff (municipal water supply purveyor) seeking damages from Dow Chemical for PCE impact at various locations in Suffolk County, NY. Affidavit submitted 2011.

MODELING EXPERIENCE (PARTIAL LISTING)

Table with 3 columns: PROJECT, MODEL, APPLICATION. Rows include Riverhead Water District, NYSDEC - Region 1, AMOCO, Keyspan Energy, Saboneck Golf Club, Suffolk County Department of Public Works, SCDPW SUNY Waste Water Treatment Plant, and Water Authority of Great Neck North.

PUBLICATIONS / PROFESSIONAL PAPERS

- Smart Pump & Treat Strategy for MTBE Impacting a Public Water Supply (14th Annual Conference on Contaminated Soils Proceedings, 1998)
Transport & Transformation of BTEX & MTBE in a Sand Aquifer (Groundwater Monitoring & Remediation 05/1998)
Characteristics of Gasoline Releases in the Water Table Aquifer of Long Island (Petroleum Hydrocarbons Conference Proceedings, 1999)
Field Applications of the Hydrocarbon Spill Screening Model (HSSM) (USEPA Interactive Modeling Web Course www.epa.gov/athens/software/training/webcourse Authored module on model application and applied use of calculators, 02/2000)
Comparative Evaluation of MTBE Sites on Long Island, US EPA Workshop on MTBE Bioremediation (Cincinnati, 02/2000)
Comparison of Four MTBE Plumes in the Upper Glacial Aquifer of Long Island (American Geophysical Union, San Francisco, 12/1996)
Analysis and Simulation of the Gasoline Spill at East Patchogue, New York (American Geophysical Union, San Francisco, 12/1998)



*ENVIRONMENTAL BUSINESS CONSULTANTS*

## **Robert Bennett, Project Manager**

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### **Professional Experience**

EBC: February 2015

Prior: 7 years

### **Education**

Bachelor of Science, Environmental Science, State University of New York College at Oneonta, Oneonta, NY

Associates in Applied Sciences, Field Biology, State University of New York College at Delhi, Delhi, NY

### **Areas of Expertise**

- Phase I / Phase II Property Assessments
- Waste Characterization / Soil Management
- Brownfield Closure and Planning Board
- Remedial Investigations
- Landfill Closure and Monitoring
- Dredging Monitoring and Management
- Title V & NY Air Permitting and Registrations
- NYS / Nassau & Suffolk County Sanitary Code Compliance

### **Professional Certification**

- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Safety
- NYSDOH Asbestos Inspector & Project Monitor
- NYCDEP Asbestos Investigator
- EPA Lead-Based Paint Inspector & Risk Assessor

### **PROFILE**

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Mr. Bennett has 7 years experience as an environmental consultant and is responsible for assessment and investigative services for a wide variety of projects, including industrial and commercial properties, mass transit facilities, parking structures, and sanitary and wastewater treatment facilities. Mr. Bennett has conducted Phase I, II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York, New Jersey, and Massachusetts.

Mr. Bennett conducts research and provides support for various projects on a daily basis and coordinates with clients, regulatory agencies, attorneys and sub-contractors to provide cost-effective business solutions for a plethora of environmental concerns. Mr. Bennett's field experience includes tank removal and installations, dredging oversight and monitoring, asbestos and lead inspections, compliance audits, spill management and closure, soil and groundwater sampling, and both the oversight and operation of soil boring and well installation equipment. In



**ENVIRONMENTAL BUSINESS CONSULTANTS**

## **Robert Bennett, Project Manager**

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addition, Mr. Bennett has performed project research, data reduction and evaluation, and has prepared reports for both regulatory and client use.

### **PREVIOUS EXPERIENCE**

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Dvirka & Bartilucci Engineers and Architects, P.C., Woodbury, NY  
Environmental Scientist II, 2014-2015

Gannett Fleming Engineers and Architects, P.C., Woodbury, NY  
Environmental Scientist, 2012-2014

Apex Companies L.L.C., Bohemia, NY  
Environmental Scientist / Project Manager, 2008-2012

### **SELECT PROJECT EXPERIENCE**

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Project: Governor's Office of Storm Recovery (GOSR) New York Rising Buyout and Acquisition Program / Superstorm Sandy Relief Program  
Location: Long Island and New York City  
Type: Phase I Environmental Site Assessments (ESAs) and Property Evaluation  
Contamination: Asbestos, Lead, Mold and PCBs  
Role: Environmental Scientist II responsible for the creation and review of a high volume of Phase I ESAs

Project: WMATA Metrorail System Assessment Program  
Location: Washington D.C. Area  
Type: Hazardous materials inspection and evaluation for planning and engineering design purposes.  
Contamination: Asbestos, Lead and PCBs  
Role: Environmental Scientist and Inspection Team Leader

Project: Armonk Square Redevelopment Plan  
Location: Armonk Square, Armonk, NY  
Type: Monitoring well and recovery well installation. Sub-slab depressurization system (SSDS) installation and operational modifications.  
Contamination: Chlorinated Solvents  
Role: Environmental Scientist responsible for the planning and oversight of monitoring well and recovery well installation. Planning, oversight, and modifications to SSDS.

Project: Newtown Creek Dredging Project for NYCDEP  
Location: NYCDEP Newtown Creek Wastewater Treatment Facility, Brooklyn, NY  
Type: Navigational waterway dredging  
Contamination: Hazardous and biological pollutants in bottom sediment.



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## **Robert Bennett, Project Manager**

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**Role:** Environmental Scientist responsible for the implementation and operation of engineering controls and turbidity monitoring.

**Project:** Boring / Coring Program, Northeast U.S. Region  
**Location:** New Bedford Harbor, New Bedford, MA. Long Island and Massachusetts.  
**Type:** Bathymetric surveys. Borings and Corings advanced through deep sediment and bedrock to determine the proper allocation dredge areas and confined aquatic disposal zones. Additionally, Vibracore drilling was conducted in shallow and easily accessible areas.

**Contamination:** PCBs  
**Role:** Environmental Scientist / Project Manager serving as an on-site geologist to interpret and record geological investigations.

**Project:** New York State Air Permit Facilities  
**Location:** Westchester, Orange and Rockland County, NY  
**Type:** Title V Air Permits, state registration and permitting for multiple industrial laundering facilities.

**Contamination:** Hazardous Air Pollutants  
**Role:** Environmental Scientist / Project Manager responsible for all air permitting work for a NY-branch office.

**Project:** Dredging Oversight and Water Quality Monitoring  
**Location:** New Bedford Harbor, New Bedford, MA  
**Type:** Bathymetric surveys. Supervised maintenance dredging and confined aquatic disposal zone excavation operations. Turbidity and sediment flocculation monitoring.

**Contamination:** PCBs  
**Role:** Environmental Scientist providing project oversight, coordinating daily with Mass DEP and sub-contractors. Documenting geological data.

**Project:** Stormwater Abatement System Inspections, Repairs and Reporting  
**Location:** Multiple retailer locations throughout New York State  
**Type:** Stormwater drainage system and stormwater control structure inspections and repairs

**Contamination:** PCBs  
**Role:** Environmental Scientist / Project Manager assigned to coordinate and perform routine inspections of drainage systems and stormwater control structures. Made repairs to stormwater appurtenances where necessary.

**Project:** ConEdison Truck-flush facility, effluent discharge monitoring.  
**Location:** Multiple ConEdison truck-flush facilities located throughout New York City, NY.



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## Robert Bennett, Project Manager

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- Type: Compliance sampling and evaluation with regard to New York City Sewer Effluent Limitations.
- Contamination: Oil & Grease, Metals, Pesticides/PCBs , VOCs, SVOCs
- Role: Effluent sampling. Coordinating with client and laboratory to conduct quarterly sampling events.
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- Project: RCRA Closure Support
- Location: Pall Corporation Former Headquarters, East Hills, NY
- Type: Environmental closure of a medical equipment manufacturing facility
- Contamination: Formic Acid, Dimethylacetamide (DMAC)
- Role: Environmental Scientist / Project Manager responsible for the supervision of the removal of all process tanks, piping and associated appurtenances. Accomplished final decommissioning activities. RCRA Closure Report.
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- Project: Brownfield Closure Support
- Location: Multiple locations throughout New York City
- Type: Remedial investigations. Interim remedial measures. Soil vapor intrusion studies. RCRA Closure.
- Contamination: VOCs, SVOCs, Oil & Grease, Pesticides/PCBs , Metals
- Role: Environmental Scientist / Project Manager responsible for preparing and conducting remedial investigations, interim remedial measures, soil vapor intrusion studies and RCRA closure.
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- Project: Mirant Bowline Power Plant Asbestos Survey
- Location: West Haverstraw, NY
- Type: Asbestos inspection. Personal exposure monitoring. Asbestos labeling Program. Reporting.
- Contamination: Asbestos
- Role: Environmental Scientist / Project Manager serving as a team leader to conduct large scale asbestos inspection, labeling program and reporting.
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- Project: Estee Lauder SPCC Facilities
- Location: Multiple manufacturing facilities throughout Long Island
- Type: Spill Prevention Control & Countermeasures (SPCC) inspections, evaluation and reporting.
- Contamination: N/A
- Role: Environmental Scientist / Project Manager responsible for conducting inspections, facility engineering review, and reporting.
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- Project: Nassau and Suffolk County Sanitary Code Facility Compliance Audits
- Location: Multiple medical equipment manufacturing facilities throughout Long Island.
- Type: Article XI and XII Sanitary Code Compliance Audits and multiple medical equipment manufacturing facilities.



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## **Robert Bennett, Project Manager**

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Contamination: N/A  
Role: Environmental Scientist / Project Manager responsible for conducting inspections, facility engineering review, and reporting.

### **PUBLICATIONS**

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Dredging and Beach Nourishment Public Notices  
(Cape Cod Times, 2008-2010)

Dredging and Beach Nourishment Public Notices  
(Yarmouth Weekly, 2008-2010)





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## **Kevin Waters, Field Manager**

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### **Professional Experience**

EBC: October 2010

Prior: 5 years

### **Education**

Bachelor of Science, Geology, State University of New York, Stony Brook

### **Areas of Expertise**

- Field Operations
- Phase II and RI Implementation, Site Characterization Studies
- Health & Safety Monitoring and Oversight
- Waste Characterization / Soil Management
- Site Logistics

### **Professional Certification**

- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

### **PROFILE**

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Mr. Waters has 10 years experience as an environmental consultant and has worked on a wide range of environmental projects. Mr. Waters has conducted Phase II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York.

Mr. Waters' field experience includes soil, air and groundwater sampling, operations and maintenance of groundwater remediation systems, tank removals, spill management and closure, and oversight of monitoring well installations. In addition, Mr. Waters has prepared reports for both regulatory and client use.

### **PREVIOUS EXPERIENCE**

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P.W. Grosser Consulting, Bohemia, NY

Field Hydrogeologist, 2003-2008

### **SELECT PROJECT EXPERIENCE**

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Project:	Former Gas Station / car wash to mixed use affordable housing / commercial
Location:	Bronx, NY, Southern Boulevard
Type:	NYS BCP, NYC E-Site Hazmat, Former gas station / gar wash
Contamination:	Petroleum - Gasoline
Role:	Field Operations Manager, Health and Safety Officer



**ENVIRONMENTAL BUSINESS CONSULTANTS**

## **Kevin Waters, Field Manager**

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### **SELECT PROJECT EXPERIENCE**

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Project: Former Uniforms for Industry Site – Richmond Hill Senior Living Residences / Richmond Place  
Location: Jamaica Ave, Richmond Hill Queens, NY  
Type: NYS BCP, NYC E-Site Hazmat, Noise, Former industrial Laundry  
Contamination: Chlorinated Solvents, Historic Fill, Petroleum - Fuel oil/Mop oil  
Role: Field Operations Manager, Health and Safety Monitoring and Field Oversight

Project: Rikers Island – West Intake Facility  
Location: NYC Department of Corrections, Rikers Island, NY  
Type: Municipal Construction Project  
Contamination: Hazardous levels of lead, heavy metals in Historic fill  
Role: Field Operations Manager, Health and Safety Monitoring and Field Oversight

Project: Residential Redevelopment Project  
Location: Williamsburg Section of Brooklyn, Wallabout Street  
Type: NYC E-Designation Site  
Contamination: Hazardous levels of lead, heavy metals, SVOCs in Historic fill  
Role: Implement RI Work Plan, Supervise sample collection in all media