Section 1 - Product and Company Information

Product Name                       CHLOROBENZENE, 99%
Product Number                     101389
Brand                              ALDRICH

Company                            Sigma-Aldrich
Street Address                     3050 Spruce Street
City, State, Zip, Country          SAINT LOUIS MO 63103 US
Technical Phone:                   314 771 5765
Emergency Phone:                   414 273 3850 Ext. 5996
Fax:                               800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name                          CAS #                 SARA 313
CHLOROBENZENE                            108-90-7              Yes

Formula         C6H5Cl
Synonyms        Benzene chloride * Chloorbenzeen (Dutch) *
                 Chlorbenzene * Chlorbenzol * Chlorobenzene
                 (Polish) * Chlorobenzene (ACGIH:OSHA) *
                 Chlorobenzenu (Czech) * Chlorobenzene (Italian) *
                 MCB * Monochloorbenzeen (Dutch) *
                 Monochlorbenzene * Monochlorbenzol (German) *
                 Monochlorbenzenzene (OSHA) * Monochlorbenzene
                 (Italian) * NCI-C54886 * Phenyl chloride *
                 Tetrosin SP

RTECS Number:   CZ0175000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Flammable. Harmful. Dangerous for the environment.
Harmful by inhalation and if swallowed. Irritating to eyes,
respiratory system and skin. Toxic to aquatic organisms, may cause
long-term adverse effects in the aquatic environment.
Target organ(s): Liver. Kidneys.

HMIS RATING
HEALTH: 2*
FLAMMABILITY: 3
REACTIVITY: 0

NFPA RATING
HEALTH: 2
FLAMMABILITY: 3
REACTIVITY: 0
*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.
Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLAMMABLE HAZARDS
Flammable Hazards: Yes

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back. Container explosion can occur under fire conditions. In advanced or massive fires the area should be evacuated and the fire should be fought from a remote explosion-resistant location.

FLASH POINT
81 °F  27 °C  Method: closed cup

EXPLOSION LIMITS
Lower: 1.3 %  Upper: 7.1 %

AUTOIGNITION TEMP
637 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.
METHODS FOR CLEANING UP
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep container closed. Keep away from heat, sparks, and open flame.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS, RTECS
| Country | Source | Type  | Value
|---------|--------|-------|-------
| USA     | ACGIH  | TWA   | 10 PPM
| USA     | MSHA Standard-air | TWA | 75 PPM (350 MG/M3)
| USA     | OSHA. | PEL   | 8H TWA 75 PPM (350 MG/M3)
| New Zealand | OEL | Remarks: check ACGIH TLV

EXPOSURE LIMITS
| Country | Source | Type  | Value
|---------|--------|-------|-------
| Poland  | NDS    |       | 50 MG/M3
| Poland  | NDSCh  |       | 150 MG/M3
| Poland  | NDSP   |       | -

Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State: Clear liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color: Colorless</td>
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</tr>
<tr>
<td>Molecular Weight</td>
<td>112.56 AMU</td>
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<tr>
<td>pH</td>
<td>N/A</td>
<td></td>
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<tr>
<td>BP/BP Range</td>
<td>132 °C</td>
<td>760 mmHg</td>
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<tr>
<td>MP/MP Range</td>
<td>-46 - -45 °C</td>
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<tr>
<td>Freezing Point</td>
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<tr>
<td>Vapor Pressure</td>
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<td>25 °C</td>
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<tr>
<td>Vapor Density</td>
<td>3.86 g/l</td>
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</tr>
<tr>
<td>Saturated Vapor Conc.</td>
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</tr>
<tr>
<td>SG/Density</td>
<td>1.107 g/cm3</td>
<td></td>
</tr>
</tbody>
</table>
Bulk Density            N/A
Odor Threshold          0.21 ppm
Volatile%               N/A
VOC Content             N/A
Water Content           N/A
Solvent Content         N/A
Evaporation Rate        N/A
Viscosity               N/A
Surface Tension         33 mN/m             25 °C
Partition Coefficient   Log Kow: 2.89
Decomposition Temp.     N/A
Flash Point             81 °F 27 °C         Method: closed cup
Explosion Limits        Lower: 1.3 %
                        Upper: 7.1 %
Flammability            N/A
Autoignition Temp       637 °C
Refractive Index        1.524
Optical Rotation        N/A
Miscellaneous Data      N/A
Solubility              Other Solvents: ETHANOL, ETHYL ETHER,
                        BENZENE CHLOROFORM

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide,
Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: Harmful if inhaled. Material is irritating to mucous
membranes and upper respiratory tract.
Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
marrow. Lungs. Testes.

SIGNS AND SYMPTOMS OF EXPOSURE
Exposure can cause: Incoordination. To the best of our
knowledge, the chemical, physical, and toxicological properties
have not been thoroughly investigated.

TOXICITY DATA
Oral
Rat
1110 mg/kg
LD50

Inhalation
Rat
2,965 ppm
LC50

Intraperitoneal
Rat
1655 MG/KG
LD50

Oral
Mouse
2300 mg/kg
LD50

Intraperitoneal
Mouse
515 MG/KG
LD50

Oral
Rabbit
2250 mg/kg
LD50

Oral
Guinea pig
2250 mg/kg
LD50

Oral
Mammal
2300 mg/kg
LD50

Inhalation
Mammal
10,000 mg/m3
LC50

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

Species: Rat
Route of Application: Oral
Dose: 61800 MG/KG
Exposure Time: 2Y
Frequency: I

NTP CARCINOGEN LIST
Rating: Some evidence.
Species: Rat
Route: Gavage
ACGIH CARCINOGEN LIST
Rating: A3

IRIS/EPA CARCINOGEN LIST
Rating: Group D

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 75 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat
Dose: 210 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Hepatobiliary system.

Species: Rabbit
Dose: 10 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-18D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - MUTAGEN

Species: Mouse
Route: Intraperitoneal
Dose: 225 MG/KG
Exposure Time: 24H
Mutation test: Micronucleus test

Species: Mouse
Dose: 70 MG/L (+S9)
Cell Type: lymphocyte
Mutation test: Mutation in microorganisms

Species: Mouse
Route: Intraperitoneal
Dose: 1 GM/KG
Mutation test: Cytogenetic analysis

Species: Mouse
Dose: 100 MG/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 300 MG/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rabbit
Dose: 590 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-18D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae
Time: 48 h
Value: 235 mg/l

Test Type: EC50 Algae
Species: Selenastrum capricornutum resp.
Time: 96 h
Value: 12.5 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 4.3 - 16 mg/l

Test Type: EC50 Daphnia
Time: 24 h
Value: 7.6 mg/l

Test Type: LC100 Fish
Species: Leuciscus idus
Time: 48 h
Value: 0.03 - 28 mg/l

Test Type: LC50 Fish
Species: Cyprinodon variegatus (Sheepshead minnow)
Time: 96 h
Value: 10 mg/l

Test Type: LC50 Fish
Species: Lepomis macrochirus (Bluegill)
Time: 76 h
Value: 4.5 - 7.40 mg/l

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

DOT
Proper Shipping Name: Chlorobenzene
UN#: 1134
Class: 3
Packing Group: Packing Group III
Hazard Label: Flammable liquid
PIH: Not PIH

IATA
Proper Shipping Name: Chlorobenzene
IATA UN Number: 1134  
Hazard Class: 3  
Packing Group: III  

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: Xn N  
Indication of Danger: Harmful. Dangerous for the environment.  
R: 10 20 51/53  
Risk Statements: Flammable. Harmful by inhalation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
S: 24/25 61  
Safety Statements: Avoid contact with skin and eyes. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Risk Statements: Harmful by inhalation and if swallowed. Irritating to eyes, respiratory system and skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
Safety Statements: Avoid contact with skin and eyes. Avoid release to the environment. Refer to special instructions/safety data sheets.  

UNITED STATES REGULATORY INFORMATION  
SARA LISTED: Yes  
DEMINIMIS: 1 %  
NOTES: This product is subject to SARA section 313 reporting requirements.  
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION  
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.  
DSL: Yes  
NDSL: No

Section 16 - Other Information

DISCLAIMER  
For R&D use only. Not for drug, household or other uses.

WARRANTY  
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 Inc., 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. Copyright 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.