SAFETY DATA SHEET
according to the (US) Hazard Communication Standard (29 CFR 1910.1200)

Revision Date 04/03/2014 Version 1.2

SECTION 1. Identification
Product identifier
  Product number  801640
  Product name  1-Chlorobutane for synthesis
  CAS-No.  109-69-3

Relevant identified uses of the substance or mixture and uses advised against
Identified uses  Chemical for synthesis

Details of the supplier of the safety data sheet
Company  EMD Millipore Corporation | 290 Concord Road, Billerica, MA 01821, United States of America | General Inquiries: +1-978-751-4321 | Monday to Friday, 9:00 AM to 4:00 PM Eastern Time (GMT-5)

Emergency telephone  800-424-9300 CHEMTREC (USA)
  +1-703-527-3887 CHEMTREC (International)
  24 Hours/day; 7 Days/week

SECTION 2. Hazards identification
GHS Classification
Flammable liquid, Category 2, H225
For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS-Labeling

   Hazard pictograms

   Signal Word
   Danger

   Hazard Statements
   H225 Highly flammable liquid and vapor.

   Precautionary Statements
   P210 Keep away from heat.

OSHA Hazards
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). This information is based on 29 CFR 1910.1200 criteria prior to adoption of the GHS and may deviate from the GHS information.

Other hazards
None known.

SECTION 3. Composition/information on ingredients

Formula \( \text{CH}_3(\text{CH}_2)_3\text{Cl} \)
Molar mass 92.57 g/mol

Hazardous ingredients

Chemical Name (Concentration)
CAS-No.
1-chlorobutane \((\geq 90 \% \text{ - } \leq 100 \% )\)
109-69-3

Exact percentages are being withheld as a trade secret.

SECTION 4. First aid measures

Description of first-aid measures

Inhalation
After inhalation: fresh air.

Skin contact
After skin contact: wash off with plenty of water. Remove contaminated clothing.

Eye contact
After eye contact: rinse out with plenty of water.

Ingestion
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately. Do not give milk, alcoholic beverages or castor oil.

Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed
irritant effects, Dermatitis, Dizziness, Unconsciousness, narcosis, inebriation, Vomiting, Headache
Drying-out effect resulting in rough and chapped skin.

Indication of any immediate medical attention and special treatment needed
Subsequently administer: Sodium sulfate (1 tablespoon/1/4 l water).

SECTION 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2), Foam, Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.
Special hazards arising from the substance or mixture
  Combustible.
  Vapors are heavier than air and may spread along floors.
  Forms explosive mixtures with air at ambient temperatures.
  Pay attention to flashback.
  Development of hazardous combustion gases or vapors possible in the event of fire.
  Fire may cause evolution of:
  Hydrogen chloride gas, Phosgene

Advice for firefighters

Special protective equipment for fire-fighters
  Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

Further information
  Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system. Cool closed containers exposed to fire with water spray.

SECTION 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
  Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact.
  Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.

  Advice for emergency responders: Protective equipment see section 8.

Environmental precautions
  Do not empty into drains. Risk of explosion.

Methods and materials for containment and cleaning up
  Cover drains. Collect, bind, and pump off spills.
  Observe possible material restrictions (see sections 7 and 10).
  Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

SECTION 7. Handling and storage

Precautions for safe handling
  Observe label precautions.

  Advice on protection against fire and explosion
    Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Conditions for safe storage, including any incompatibilities
  Keep container tightly closed in a dry and well-ventilated place. Protected from light. Keep away from heat and sources of ignition.

  Store at +15°C to +25°C (+59°F to +77°F).
SECTION 8. Exposure controls/personal protection

Exposure limit(s)
Contains no substances with occupational exposure limit values.

Engineering measures
Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

Individual protection measures
Protective clothing should be selected specifically for the workplace, depending on concentration and quantity of the hazardous substances handled. The chemical resistance of the protective equipment should be inquired at the respective supplier.

Hygiene measures
Change contaminated clothing. Application of skin-protective barrier cream recommended. Wash hands after working with substance.

Eye/face protection
Safety glasses

Hand protection
Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Other protective equipment:
Flame retardant antistatic protective clothing

Respiratory protection
required when vapors/aerosols are generated. Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

SECTION 9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>liquid</td>
</tr>
<tr>
<td>Color</td>
<td>colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>stinging</td>
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<tr>
<td>Odor Threshold</td>
<td>No information available.</td>
</tr>
<tr>
<td>pH</td>
<td>No information available.</td>
</tr>
<tr>
<td>Melting point</td>
<td>-123 °C</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>ca. 174 °F (79 °C) at 1,013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>ca. 1 °F (-17 °C) Method: DIN 51755 Part 1</td>
</tr>
</tbody>
</table>
Evaporation rate | No information available.  
---|---  
Flammability (solid, gas) | No information available.  
Lower explosion limit | 1.8 %(V)  
Upper explosion limit | 10.1 %(V)  
Vapor pressure | ca.110 hPa  
| at 68 °F (20 °C)  
Relative vapor density | 3.2  
Density | 0.886 g/cm³  
| at 68 °F (20 °C)  
Relative density | No information available.  
Water solubility | ca.0.5 g/l  
| at 68 °F (20 °C)  
Partition coefficient: n-octanol/water | log Pow: 2.66  
| OECD Test Guideline 107  
| Bioaccumulation is not expected.  
Autoignition temperature | No information available.  
Decomposition temperature | No information available.  
Viscosity, dynamic | 0.45 mPa.s  
| at 68 °F (20 °C)  
Explosive properties | Not classified as explosive.  
Oxidizing properties | none  
Ignition temperature | ca. 536 °F (280 °C)

### SECTION 10. Stability and reactivity

**Reactivity**
- Vapors may form explosive mixture with air.

**Chemical stability**
- Sensitivity to light  
- Sensitive to air.  
- Decomposes on exposure to light.

**Possibility of hazardous reactions**
- Risk of explosion with:  
  - Alkali metals, Alkaline earth metals, sodium amide
Risk of ignition or formation of inflammable gases or vapors with:
Oxidizing agents, Powdered light metals

**Conditions to avoid**
Warming.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.

**Incompatible materials**
various plastics, Light metals

**Hazardous decomposition products**
in the event of fire: See section 5.

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**SECTON 11. Toxicological information**

**Information on toxicological effects**

*Likely route of exposure*
Inhalation, Eye contact, Skin contact

*Acute oral toxicity*
LD50 rat: 2,200 mg/kg (IUCLID)
Symptoms: Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.

*Acute inhalation toxicity*
LC50 rat: > 30.8 mg/l; 4 h (IUCLID)
Symptoms: slight mucosal irritations

*Acute dermal toxicity*
LDLO rabbit: 20 g/kg
(RTECS)

*Skin irritation*
rabbit
Result: No irritation
(IUCLID)
Drying-out effect resulting in rough and chapped skin. Dermatitis

*Eye irritation*
rabbit
Result: No eye irritation
(IUCLID)
slight irritation

*Sensitization*
Sensitization test: guinea pig
Result: negative
Method: OECD Test Guideline 406

*Genotoxicity in vitro*
Mutagenicity (mammal cell test): chromosome aberration.
Result: negative
(National Toxicology Program)
Ames test
Salmonella typhimurium
Result: negative
(National Toxicology Program)

**Specific target organ systemic toxicity - single exposure**
The substance or mixture is not classified as specific target organ toxicant, single exposure.

**Specific target organ systemic toxicity - repeated exposure**
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

**Aspiration hazard**
Regarding the available data the classification criteria are not fulfilled.

**Carcinogenicity**

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

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

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

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

**Further information**
After absorption of toxic quantities:
narcosis
Possible symptoms:
Headache, Vomiting, inebriation, Dizziness, Unconsciousness
Chronic intoxication:
Damage to:
Liver
Further data:
Handle in accordance with good industrial hygiene and safety practice.

**SECTION 12. Ecological information**

**Ecotoxicity**

**Toxicity to fish**
LC50 Leuciscus idus (Golden orfe): 600 mg/l; 48 h
DIN 38412 part 15

**Toxicity to daphnia and other aquatic invertebrates**
EC50 Daphnia magna (Water flea): 452 mg/l; 48 h
OECD Test Guideline 202
Toxicity to algae
IC50 Desmodesmus subspicatus (green algae): > 450 mg/l; 72 h (IUCLID)
NOEC Desmodesmus subspicatus (green algae): 90 mg/l; 72 h (External MSDS)

Toxicity to bacteria
BRINGMANN-KüHN-TEST EC10 Pseudomonas putida: 332 mg/l; 18 h (IUCLID)

Persistence and degradability
Biodegradability
47 %; 28 d
ISO 10708
Not readily biodegradable.

Bioaccumulative potential
Partition coefficient: n-octanol/water
log Pow: 2.66
OECD Test Guideline 107
Bioaccumulation is not expected.

Mobility in soil
No information available.

Other adverse effects
Henry constant
1690 Pa*m³/mol
Method: (experimental)
(Lit.) Distribution preferentially in air.

Additional ecological information
Discharge into the environment must be avoided.

SECTION 13. Disposal considerations
The information presented only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. Disposal should be in accordance with applicable regional, national and local laws and regulations.

SECTION 14. Transport information
Land transport (DOT)
UN number UN 1127
Proper shipping name CHLOROBUTANES
Class 3
Packing group II
Environmentally hazardous --

Air transport (IATA)
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<table>
<thead>
<tr>
<th>Product number</th>
<th>801640</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

UN number: UN 1127
Proper shipping name: CHLOROBUTANES
Class: 3
Packing group: II
Environmentally hazardous: --
Special precautions for user: no

Sea transport (IMDG)
UN number: UN 1127
Proper shipping name: CHLOROBUTANES
Class: 3
Packing group: II
Environmentally hazardous: --
Special precautions for user: yes
EmS: F-E S-D

SECTION 15. Regulatory information
United States of America

OSHA Hazards
Flammable Liquid

This information is based on 29 CFR 1910.1200 criteria prior to adoption of the GHS, and may deviate from the GHS information on the label and in section 2.

SARA 311/312 Hazards
Fire Hazard

SARA 313
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 302
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

Clean Water Act
This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

DEA List I
Not listed

DEA List II
Not listed

US State Regulations
Massachusetts Right To Know
Ingredients
1-chlorobutane

Pennsylvania Right To Know
Ingredients
1-chlorobutane

New Jersey Right To Know
Ingredients
1-chlorobutane

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

Notification status
TSCA: All components of the product are listed in the TSCA-inventory.

DSL: All components of this product are on the Canadian DSL.

SECTION 16. Other information

Training advice
Provide adequate information, instruction and training for operators.

Full text of H-Statements referred to under sections 2 and 3.
H225 Highly flammable liquid and vapor.

Key or legend to abbreviations and acronyms used in the safety data sheet
Used abbreviations and acronyms can be looked up at www.wikipedia.org.

Revision Date 04/03/2014

The information contained herein is based on the present state of our knowledge. It characterizes the product with regard to appropriate safety precautions. It does not represent a warranty of any product properties and we assume no liability for any loss or injury which may result from the use of this information. Users should conduct their own investigations to determine the suitability of the information.

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