The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.

SAFETY DATA SHEET
Version 6.6
Revision Date 08/09/2023
Print Date 08/12/2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
- Product name: Boron trichloride solution
- Product Number: 178934
- Brand: Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against
- Identified uses: Laboratory chemicals, Synthesis of substances
- Uses advised against: This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.

1.3 Details of the supplier of the safety data sheet
- Company: Sigma-Aldrich Inc.
  3050 SPRUCE ST
  ST. LOUIS MO 63103
  UNITED STATES
- Telephone: +1 314 771-5765
- Fax: +1 800 325-5052

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

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
- GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
  - Acute toxicity, Oral (Category 3), H301
  - Acute toxicity, Inhalation (Category 3), H331
  - Skin corrosion (Category 1B), H314
  - Serious eye damage (Category 1), H318
  - Carcinogenicity (Category 2), H351
  - Reproductive toxicity (Category 1B), H360
  - Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

<table>
<thead>
<tr>
<th>Pictogram</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Pictogram" /></td>
</tr>
</tbody>
</table>

**Signal Word**  
Danger

**Hazard statement(s)**
- H301 + H331  
  Toxic if swallowed or if inhaled.
- H314  
  Causes severe skin burns and eye damage.
- H336  
  May cause drowsiness or dizziness.
- H351  
  Suspected of causing cancer.
- H360  
  May damage fertility or the unborn child.

**Precautionary statement(s)**
- P201  
  Obtain special instructions before use.
- P202  
  Do not handle until all safety precautions have been read and understood.
- P261  
  Avoid breathing mist or vapors.
- P264  
  Wash skin thoroughly after handling.
- P270  
  Do not eat, drink or smoke when using this product.
- P271  
  Use only outdoors or in a well-ventilated area.
- P280  
  Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P301 + P310 + P330  
  IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
- P301 + P330 + P331  
  IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353  
  IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
- P304 + P340 + P310  
  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
- P305 + P351 + P338 + P310  
  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
- P308 + P313  
  IF exposed or concerned: Get medical advice/ attention.
- P363  
  Wash contaminated clothing before reuse.
- P403 + P233  
  Store in a well-ventilated place. Keep container tightly closed.
- P405  
  Store locked up.
- P501  
  Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.2 Mixtures

<table>
<thead>
<tr>
<th>Formula</th>
<th>Molecular weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCl₃</td>
<td>117.17 g/mol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
</table>

Aldrich - 178934

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada

Millipore Sigma
SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

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

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Borane/boron oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 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.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 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 carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage stability
Recommended storage temperature
2 - 8 °C

Store under inert gas.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichloromethane</td>
<td>75-09-2</td>
<td>TWA</td>
<td>50 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>
|                    |         |       |                    | Remarks
|                    |         |       | Confirmed animal carcinogen with unknown relevance to humans |
| Boron chloride     | 10294-34-5 | C    | 0.7 ppm            | USA. ACGIH Threshold Limit Values (TLV)                      |

Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
</table>
8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin 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.

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance  Form: liquid  
Color: dark yellow  
b) Odor  No data available  
c) Odor Threshold  No data available  
d) pH  No data available  
e) Melting point/freezing point  No data available  
f) Initial boiling point and boiling range  No data available  
g) Flash point  () No data available  
h) Evaporation rate  No data available  
i) Flammability (solid, gas)  No data available  
j) Upper/lower flammability or explosive limits  No data available  
k) Vapor pressure  2,048.5 hPa at 55 °C (131 °F)  
l) Vapor density  No data available  
m) Density  1.326 g/mL at 25 °C (77 °F)  
Relative density  No data available  
n) Water solubility  No data available  
o) Partition coefficient: n-octanol/water  No data available  
p) Autoignition temperature  No data available  
q) Decomposition temperature  No data available  
r) Viscosity  No data available  
s) Explosive properties  Not classified as explosive.  
t) Oxidizing properties  none  

9.2 Other safety information  
No data available  

SECTION 10: Stability and reactivity  

10.1 Reactivity  
No data available  

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada  

MilliporeSigma
10.2 **Chemical stability**
The product is chemically stable under standard ambient conditions (room temperature).

10.3 **Possibility of hazardous reactions**
No data available

10.4 **Conditions to avoid**
Heat.
No information available

10.5 **Incompatible materials**
Reacts violently with water.

10.6 **Hazardous decomposition products**
In the event of fire: see section 5

---

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Mixture**

**Acute toxicity**
Oral: No data available
Acute toxicity estimate Oral - 55.52 mg/kg (Calculation method)
Symptoms: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.

Inhalation: No data available
Acute toxicity estimate Inhalation - 4 h - 6.67 mg/l - vapor (Calculation method)
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages: damage of respiratory tract
Acute toxicity estimate Dermal - 2,747 mg/kg (Calculation method)

**Skin corrosion/irritation**
Remarks: Mixture causes burns.

**Serious eye damage/eye irritation**
Remarks: Mixture causes serious eye damage. Risk of blindness!

**Respiratory or skin sensitization**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
Evidence of a carcinogenic effect.
IARC: 2A - Group 2A: Probably carcinogenic to humans (Dichloromethane)
NTP: RAHC - Reasonably anticipated to be a human carcinogen (Dichloromethane)
OSHA: OSHA specifically regulated carcinogen (Dichloromethane)

**Reproductive toxicity**
May harm the unborn child.
May impair fertility.

**Specific target organ toxicity - single exposure**
Mixture may cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

11.2 Additional Information

Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Drowsiness, Weakness
Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

**Components**

**Dichloromethane**

**Acute toxicity**
LD50 Oral - Rat - male and female - > 2,000 mg/kg (OECD Test Guideline 401)
LC50 Inhalation - Mouse - 4 h - 86 mg/l - vapor
Remarks: (ECHA)
Symptoms: Possible damages:, mucosal irritations
LD50 Dermal - Rat - male and female - > 2,000 mg/kg (OECD Test Guideline 402)

**Skin corrosion/irritation**
Skin - Rabbit
Result: Irritations - 4 h (OECD Test Guideline 404)
Remarks: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Eye irritation
Remarks: (ECHA)
Remarks: Risk of corneal clouding.

**Respiratory or skin sensitization**
Local lymph node assay (LLNA) - Mouse
Result: negative  
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Result: positive
Test Type: Ames test
Test system: Salmonella typhimurium
Result: positive
Method: OECD Test Guideline 474
Species: Mouse - male and female - Bone marrow
Result: negative

Carcinogenicity
Suspected of causing cancer.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
Inhalation - May cause drowsiness or dizziness. - Central nervous system
Acute inhalation toxicity - Possible damages:; mucosal irritations

Specific target organ toxicity - repeated exposure

Aspiration hazard
No data available

Boron chloride

Acute toxicity
Acute toxicity estimate Oral - 5.1 mg/kg
(Expert judgment)
Oral: No data available
Acute toxicity estimate Inhalation - 4 h - 0.6 mg/l - vapor
(Expert judgment)
Inhalation: Corrosive to respiratory system.
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Remarks: Causes skin burns.
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Remarks: Causes serious eye damage.

Respiratory or skin sensitization
Did not cause sensitization on laboratory animals.
**Germ cell mutagenicity**
Test Type: Ames test  
Test system: S. typhimurium  
Result: negative  
Test Type: Chromosome aberration test in vitro  
Test system: Chinese hamster ovary cells  
Result: negative  
Remarks: (ECHA)  
Test Type: In vitro mammalian cell gene mutation test  
Test system: mouse lymphoma cells  
Result: negative

**Carcinogenicity**  
No data available

**Reproductive toxicity**  
May damage the unborn child.  
May damage fertility.

**Specific target organ toxicity - single exposure**  
Inhalation - May cause respiratory irritation. - Respiratory Tract

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

**Aspiration hazard**  
No aspiration toxicity classification

---

**SECTION 12: Ecological information**

12.1 **Toxicity**
- **Mixture**  
  No data available

12.2 **Persistence and degradability**  
No data available

12.3 **Bioaccumulative potential**  
No data available

12.4 **Mobility in soil**  
No data available

12.5 **Results of PBT and vPvB assessment**  
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 **Endocrine disrupting properties**  
No data available

12.7 **Other adverse effects**  
No data available

**Components**
- **Dichloromethane**  
  Toxicity to fish flow-through test LC50 - Pimephales promelas (fathead)
Toxicity to daphnia and other aquatic invertebrates static test LC50 - Daphnia magna (Water flea) - 27 mg/l - 48 h (US-EPA)

Toxicity to bacteria static test EC50 - activated sludge - 2,590 mg/l - 40 min (OECD Test Guideline 209)

Toxicity to fish (Chronic toxicity) flow-through test LC50 - Pimephales promelas (fathead minnow) - 471 mg/l - 8 d
Remarks: (ECHA)

---

**SECTION 13: Disposal considerations**

**13.1 Waste treatment methods**

**Product**
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

---

**SECTION 14: Transport information**

**DOT (US)**
UN number: 2922  Class: 8 (6.1)  Packing group: II
Proper shipping name: Corrosive liquids, toxic, n.o.s. (Boron chloride, Dichloromethane)
Reportable Quantity (RQ): 1098 lbs
Poison Inhalation Hazard: No

**IMDG**
UN number: 2922  Class: 8 (6.1)  Packing group: II  EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, TOXIC, N.O.S. (Boron chloride, Dichloromethane)

**IATA**
UN number: 2922  Class: 8 (6.1)  Packing group: II
Proper shipping name: Corrosive liquid, toxic, n.o.s. (Boron chloride, Dichloromethane)

---

**SECTION 15: Regulatory information**
US TSCA Section 3
This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.

SARA 302 Components
Boron chloride

CAS-No.         Revision Date
10294-34-5      2007-03-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

Dichloromethane

CAS-No.         Revision Date
75-09-2          2007-07-01
10294-34-5      2007-03-01

Boron chloride

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Dichloromethane

CAS-No.         Revision Date
75-09-2          2007-07-01
10294-34-5      2007-03-01

Pennsylvania Right To Know Components

Dichloromethane

CAS-No.         Revision Date
75-09-2          2007-07-01
10294-34-5      2007-03-01

Boron chloride

California Prop. 65 Components
, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.Dichloromethane

CAS-No.         Revision Date
75-09-2          2007-09-28

Other regulations
This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.
SECTION 16: Other information

Further information
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 Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact misbranding@sial.com.

Version: 6.6    Revision Date: 08/09/2023    Print Date: 08/12/2023