Boron trichloride

Safety Data Sheet E-4566

according to the Hazardous Products Regulation (February 11, 2015)

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SECTION 1: Identification

1.1. Product identifier

Product form	:	Substance
Substance name	:	Boron trichloride
CAS No	:	10294-34-5
Formula	:	BCl3
Other means of identification	:	Boron chloride, Trichloroborane.
Product group	:	Core Products

1.2. Recommended use and restrictions on use

Recommended uses and restrictions	:	Industrial use,Use as directed.

1.3. Supplier

Linde Canada inc.
500 — 5015 Spectrum Way
Mississauga - Canada L4W 0E4
T 1-905-803-1600 - F 1-905-803-1682
www.lindecanada.ca

1.4. Emergency telephone number

Emergency number	:	1-800-363-0042 Call emergency number 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Linde sales representative.

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-CA classification

Gases under pressure : Liquefied gas	H280
Acute toxicity (inhalation:gas) Category 3	H331
Skin corrosion/irritation, Category 1B	H314
Serious eye damage/eye irritation, Category 1	H318

2.2. GHS Label elements, including precautionary statements

GHS-CA labelling

Hazard pictograms :

GHS04 GHS05 GHS06

Signal word : DANGER

Hazard statements : CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
CAUSES SEVERE SKIN BURNS AND EYE DAMAGE
TOXIC IF INHALED
CORROSIVE TO THE RESPIRATORY TRACT (This statement supercedes H335)

Precautionary statements : Do not handle until all safety precautions have been read and understood
Avoid breathing gas
Do not get in eyes, on skin, or on clothing.
Use and store only outdoors or in a well-ventilated area.
Wear protective gloves, protective clothing, eye protection, face protection, Respiratory protection
Store locked up

Dispose of contents/container in accordance with container Supplier/owner instructions
Protect from sunlight when ambient temperature exceeds 52°C (125°F).
Use a back flow preventive device in the piping.
Close valve after each use and when empty.
Do not open valve until connected to equipment prepared for use.
When returning cylinder, install leak tight valve outlet cap or plug.
Use only with equipment of compatible materials of construction and rated for cylinder pressure.

2.3. Other hazards

Other hazards which do not result in classification : Overexposure to vapor concentrations moderately above 5 ppm irritates the upper respiratory tract. Intolerable concentrations range from 50-100 ppm. High concentrations (greater than 50 ppm) severely irritate the upper respiratory tract, causing the throat to burn and producing choking and coughing. Pulmonary edema; general lung injury; ulceration to the nose, throat, and larynx; and laryngeal spasm may also occur. Exposure to concentrations of 1500-2000 ppm for a few minutes is life-threatening. Liver and kidney injury have been reported after exposure to vapors. At higher concentrations, victim may suffocate from lack of oxygen.

2.4. Unknown acute toxicity (GHS CA)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	CAS No.	% (Vol.)	Common Name (synonyms)
Boron trichloride (Main constituent)	(CAS No) 10294-34-5	100	Borane, trichloro-

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician. . WARNING: To avoid possible chemical burns, the rescuer should avoid breathing any exhaled air from the victim.

First-aid measures after skin contact : In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/injuries : No additional information available

Symptoms/injuries after inhalation : Overexposure to vapor concentrations moderately above 5 ppm irritates the upper respiratory tract. Intolerable concentrations range from 50-100 ppm. High concentrations (greater than 50 ppm) severely irritate the upper respiratory tract, causing the throat to burn and producing choking and coughing. Pulmonary edema; general lung injury; ulceration to the nose, throat, and larynx; and laryngeal spasm may also occur. Exposure to concentrations of 1500-2000 ppm for a few minutes is life-threatening. Liver and kidney injury have been reported after exposure to vapors. At higher concentrations, victim may suffocate from lack of oxygen.

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : Obtain medical assistance.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Unsuitable extinguishing media

Unsuitable extinguishing media : Reacts with water.

5.3. Specific hazards arising from the hazardous product

Reactivity : No reactivity hazard other than the effects described in sub-sections below.

Reactivity in case of fire : No reactivity hazard other than the effects described in sub-sections below.

5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions : **DANGER! Toxic, corrosive, liquefied gas.**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with their provincial and local fire code regulations.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

If leaking do not spray water (reacts violently).

Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **DANGER: Toxic. Corrosive.** Wear a self-contained breathing apparatus and appropriate personal protective equipment (PPE). (gas tight, chemical-protective) Evacuate personnel to a safe area. Approach suspected leak area with caution. Remove all sources of ignition. Toxic, corrosive vapor can spread from spill. Ventilate area or move container to a well-ventilated area. Before entering the area, especially a confined area, check the atmosphere with an appropriate device. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.2. Methods and materials for containment and cleaning up

For containment : Prevent runoff from contaminating the surrounding environment.

Methods for cleaning up : This material is a Toxic Gas. Any leaks should be handled by Emergency Response personnel. For assistance call your supplier.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Do not breathe gas/vapour. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g, wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 52 °C (125 °F). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Boron trichloride (10294-34-5)		
USA - ACGIH	ACGIH OEL C [ppm]	0.7 ppm
Manitoba	OEL C [ppm]	0.7 ppm
New Foundland & Labrador	OEL C [ppm]	0.7 ppm
Nova Scotia	OEL C [ppm]	0.7 ppm
Prince Edward Island	OEL C [ppm]	0.7 ppm

8.2. Appropriate engineering controls

Appropriate engineering controls : Use corrosion-proof equipment. USE ONLY IN A CLOSED SYSTEM. An explosion-proof, corrosion-resistant, forced-draft fume hood is preferred.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment : Safety glasses. Face shield. Gloves.

Hand protection : Wear work gloves when handling containers. Wear heavy rubber gloves where contact with product may occur.

Eye protection	:	Wear goggles and a face shield when transfilling or breaking transfer connections. Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.
Respiratory protection	:	**Respiratory protection:** Use air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below OEL (if applicable). Select in accordance with provincial regulations, local bylaws or guidelines. Respirators should also be approved by NIOSH and MSHA. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Other information	:	**Other protection :** Safety shoes for general handling at customer sites. Metatarsal shoes and cuffless trousers for cylinder handling at packaging and filling plants. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines. For working with flammable and oxidizing materials, consider the use of flame resistant anti-static safety clothing.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

(a) Physical state	:	Gas
(b) Colour	:	Gives off white fumes in moist air.
(c) Odour	:	Pungent.
Odour threshold	:	No data available
(d) Melting point	:	-107 °C
Freezing point	:	No data available
(e) Boiling point	:	12.4 °C
(f) Flammability	:	Non flammable
(g) Flammability (solid, gas)	:	
(h) Flash point	:	Not applicable.
(i) Auto-ignition temperature	:	Not applicable.
(j) Decomposition temperature	:	No data available
(k) pH	:	Not applicable.
(l) Viscosity, kinematic	:	Not applicable.
(m) Solubility	:	Water: No data available
(n) Partition coefficient – n-octanol/water [log Pow/log Kow]	:	Not applicable.
(o) Vapour pressure	:	1.317 bar , 19.1 psia (70°F/21.1°C)
(p) Density	:	
Relative gas density	:	4
(r) Particle characteristics	:	No data available
(s) Molecular mass	:	117 g/mol
(t) Critical temperature	:	178.8 °C
(u) Critical pressure	:	3870 kPa
(v) Oxidizing properties	:	None.
(w) Relative evaporation rate (butylacetate=1)	:	No data available
Relative evaporation rate (ether=1)	:	Not applicable.

9.2. Other information

Gas group	:	Liquefied gas
Additional information	:	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

Reactivity	:	No reactivity hazard other than the effects described in sub-sections below.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	May occur. REACTS VIOLENTLY WITH WATER.

Conditions to avoid	:	Avoid moisture in installation systems.
Incompatible materials	:	Water. Avoid all organic materials. Hydrogen. Ammonia. Oxygen. Alcohols. Nitrogen peroxide.
Hazardous decomposition products	:	Thermal decomposition may produce : Toxic fumes. Chlorides. Hydrochloric acid. Boric acid. Grease. Reacts with water to form toxic and corrosive vapours.

SECTION 11: Toxicological information

11.1 Likely routes of exposure : Inhalation

11.2 Symptoms related to the physical, chemical, and toxicological characteristics : No additional information available

11.3 Delayed and immediate effects and chronic effects

Acute toxicity (oral)	:	Not classified
Acute toxicity (dermal)	:	Not classified
Acute toxicity (inhalation)	:	TOXIC IF INHALED.
Skin corrosion/irritation	:	CAUSES SEVERE SKIN BURNS. pH: Not applicable.
Serious eye damage/irritation	:	CAUSES SERIOUS EYE DAMAGE. pH: Not applicable.
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified
Specific target organ toxicity (single exposure)	:	Not classified
Specific target organ toxicity (repeated exposure)	:	Not classified
Aspiration hazard	:	Not classified

11.4 Toxicity

Boron trichloride (\f)10294-34-5	
LC50 inhalation rat (ppm)	2541 ppm/1h
ATE CA (Gases)	1270.5 ppmv/4h

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No known ecological damage caused by this product.

12.2. Persistence and degradability

Boron trichloride (10294-34-5)	
Persistence and degradability	Not applicable for inorganic gases.

12.3. Bioaccumulative potential

Boron trichloride (10294-34-5)	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Boron trichloride (10294-34-5)	
Mobility in soil	No data available.
Log Pow	Not applicable.
Log Kow	Not applicable.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.
Effect on the ozone layer : None.
Effect on global warming : No known effects from this product.

SECTION 13: Disposal considerations

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

TDG

UN-No. (TDG) : UN1741
TDG Primary Hazard Classes : 2.3 - Class 2.3 - Toxic Gases
TDG Subsidiary Classes : 8
Proper shipping name : BORON TRICHLORIDE

ERAP Index : 500
Explosive Limit and Limited Quantity Index : 0
Passenger Carrying Ship Index : Forbidden
Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : Forbidden

14.2. Air and sea transport

IMDG

UN-No. (IMDG) : 1741
Class (IMDG) : 2 - Gases
MFAG-No : 125

IATA

UN-No. (IATA) : 1741
Class (IATA) : 2 - Gases

SECTION 15: Regulatory information

15.1. National regulations

Boron trichloride (10294-34-5)
Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Boron trichloride (10294-34-5)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Japanese Poisonous and Deleterious Substances Control Law
Japanese Pollutant Release and Transfer Register Law (PRTR Law)
Listed on INSQ (Mexican National Inventory of Chemical Substances)

SECTION 16: Other information

Date of issue : 15/10/1979

Revision date : 28/07/2023

Supersedes : 01/01/2021

Indication of changes:

Training advice : Users of breathing apparatus must be trained. Ensure operators understand the toxicity hazard.

Other information : When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

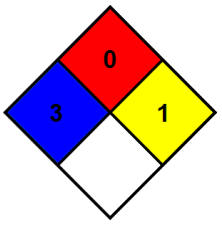
Linde Canada asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Linde Canada Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Canada Inc, it is the user's obligation to determine the conditions of safe use of the product. Linde Canada Inc, SDSs are furnished on sale or delivery by Linde Canada Inc, or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Linde sales representative, local distributor, or supplier, or download from www.lindecanada.ca.

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA instability : 1 - Normally stable, but can become unstable at elevated temperatures and pressures or may react with water with some release of energy, but not violently.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.