



Borontribromide

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Borontribromide
UN-Number	UN2692
Recommended Use	Electronics.
Synonyms	Tribromoborane
Supplier Address*	<p>Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC 575 Mountain Ave. Murray Hill, NJ 07974 Phone: 908-464-8100 www.lindeus.com</p> <p>Linde Gas Puerto Rico, Inc. Las Palmas Village Road No. 869, Street No. 7 Catano, Puerto Rico 00962 Phone: 787-641-7445 www.pr.lindegas.com</p> <p>Linde Canada Limited 5860 Chedworth Way Mississauga, Ontario L5R 0A2 Phone: 905-501-1700 www.lindecana.com</p>
	<p>* May include subsidiaries or affiliate companies/divisions.</p> <p>For additional product information contact your local customer service.</p>
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

DANGER!		
Emergency Overview		
Corrosive		
Water reactive		
Fatal if inhaled.		
Very toxic if swallowed		
The product causes burns of eyes, skin and mucous membranes.		
Appearance	Physical State	Odor
Pale yellow to orange	Liquid.	Pungent

OSHA Regulatory Status	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
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Potential Health Effects

Principle Routes of Exposure	Inhalation. Eye contact. Skin contact. Ingestion.
Acute Toxicity	
Inhalation	Fatal if inhaled. Forms hydrogen bromide in the presence of moisture. Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate.
Eyes	Corrosive to the eyes and may cause severe damage including blindness.
Skin	Contact with moist skin causes skin burns
Skin Absorption Hazard	No known hazard by skin absorption.
Ingestion	Very toxic if swallowed Ingestion causes burns of the upper digestive and respiratory tract. Ingestion is unlikely due to pungent choking odor.
Chronic Effects	No information available.
Aggravated Medical Conditions	Skin disorders. Respiratory disorders. Pre-existing eye disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Boron tribromide	10294-33-4	> 99	BBr ₃

4. FIRST AID MEASURES

General Advice	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Eye Contact	Immediate medical attention is required. In case of contact with substance, immediately flush eyes with running water for at least 30 minutes. Keep eye wide open while rinsing.
Skin Contact	Immediate medical attention is required. Wash off immediately with soap and plenty of water for at least 30 minutes while removing all contaminated clothing and shoes.
Inhalation	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.
Ingestion	Not an expected route of exposure. Immediate medical attention is required. Do NOT induce vomiting. If victim is conscious, rinse mouth and give 4-8 ounces of water or milk to dilute. Never give anything by mouth to an unconscious person.
Notes to Physician	Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure. Treat symptomatically.
Protection of First-aiders	Use personal protective equipment. Avoid contact with skin, eyes and clothing.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not flammable.
Suitable Extinguishing Media	Dry powder. Foam. Carbon dioxide (CO ₂).
Unsuitable Extinguishing Media	DO NOT USE WATER. Water reactive.
Hazardous Combustion Products	Hydrobromic acid. Bromine.
<u>Explosion Data</u>	
Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	None
Specific Hazards Arising from the Chemical	Material hydrolyzes in contact with moisture releasing toxic and corrosive fumes of aqueous hydrobromic acid. Continue to cool fire exposed cylinders until flames are extinguished. Cylinders may rupture under extreme heat. Damaged cylinders should be handled only by specialists.
Protective Equipment and Precautions for Firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Additional chemical protective clothing may be required to protect from toxic decomposition products.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use personal protective equipment. Do not touch or walk through spilled material. Do not get in eyes, on skin, or on clothing.
Environmental Precautions	Prevent further leakage or spillage if safe to do so. Prevent spreading of vapors through sewers, ventilation systems and confined areas. Do not allow material to contaminate ground water system. Should not be released into the environment.
Methods for Containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.
Methods for Cleaning Up	Neutralize with soda ash (sodium carbonate) or lime over area of spill. Return cylinder to Linde or an authorized distributor.
Other Information	Refer to protective measures listed in Sections 7 and 8.

7. HANDLING AND STORAGE

Handling	<p>Keep product scrupulously dry. Corrosive to most metals when water is present.</p> <p>Use only in ventilated areas. Do not breathe vapors or spray mist. Do not eat, drink or smoke when using this product. Avoid contact with skin, eyes and clothing. Reacts violently with water. Wash thoroughly after handling.</p> <p>Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Protect drums from physical damage, do not drag, roll, slide or drop.</p> <p>Handle in accordance with good industrial hygiene and safety practice.</p>
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Storage Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Outside or detached storage is preferred. Keep in a dry, cool and well-ventilated place. Keep container closed when not in use. Protect from physical damage. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Boron tribromide 10294-33-4	Ceiling: 1 ppm	(vacated) Ceiling: 1 ppm (vacated) Ceiling: 10 mg/m ³	Ceiling: 1 ppm Ceiling: 10 mg/m ³

OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. NIOSH IDLH: Immediately Dangerous to Life or Health.

Engineering Measures Showers. Eyewash stations. Ventilation systems.

Ventilation Use ventilation adequate to keep exposures below recommended exposure limits.

Personal Protective Equipment

Eye/Face Protection Tightly fitting safety goggles. Face-shield.

Skin and Body Protection Appropriate protective and chemical resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing to prevent exposure. For materials of construction consult protective clothing manufacturer's specifications.

Respiratory Protection

General Use If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Emergency Use Use positive pressure air line respirator or self-contained breathing apparatus for exposure over exposure limits or emergency use.

Hygiene Measures When using, do not eat, drink or smoke. Remove and wash contaminated clothing before re-use. Keep away from food, drink and animal feeding stuffs. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. Wear suitable gloves and eye/face protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Pale yellow to orange.	Odor	Pungent.
Odor Threshold	No information available	Physical State	Liquid
Flash Point	No information available.	Autoignition Temperature	No information available.
Decomposition Temperature	No information available.	Boiling Point/Boiling Range	91.3°C / 196.34°F
Freezing Point	-46°C / -50.8°F	Molecular Weight	250.54
Water Solubility	Reacts with water	Evaporation Rate	No information available
Vapor Pressure	40 mmHg @ 14°C	Vapor Density	No data available.
VOC Content (%)	Not applicable.	Flammability Limits in Air	
		Upper	Not applicable
		Lower	Not applicable

10. STABILITY AND REACTIVITY

Stability	Stable.
Incompatible Products	Water. Reactive metals. Strong bases. Acids.
Conditions to Avoid	Contact with water or moist air liberates irritating gas.
Hazardous Decomposition Products	Hydrogen bromide. bismuth oxybromide.
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral:	No information available.
LD50 Dermal:	No information available.
LC50 Inhalation:	No information available.
Repeated Dose Toxicity	No information available.

Chronic Toxicity

Chronic Toxicity	No information available.
Carcinogenicity	Contains no ingredient listed as a carcinogen.

Irritation	No information available.
Sensitization	No information available.
Reproductive Toxicity	No information available.
Developmental Toxicity	No information available.
Synergistic Materials	None known.
Target Organ Effects	Respiratory system.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods	Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.
Contaminated Packaging	Do not re-use empty containers.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Boron tribromide
Hazard Class	8
Subsidiary Class	6.1
UN-Number	UN2692
Packing Group	I
Description	UN2692, Boron tribromide, 8, (6.1), I
Emergency Response Guide Number	157

TDG

Proper Shipping Name	Boron tribromide
Hazard Class	8
UN-Number	UN2692
Packing Group	I
Description	UN2692, BORON TRIBROMIDE, 8, I

MEX

Proper Shipping Name	Boron tribromide
Hazard Class	8
UN-Number	UN2692
Description	UN2692 Boron tribromide, 8, I
Packing Group	I

IATA

UN-Number	UN2692
Proper Shipping Name	Boron tribromide
Hazard Class	8
ERG Code	8L
Description	UN2692, Boron tribromide, 8
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	Forbidden

IMDG/IMO

Proper Shipping Name	Boron tribromide
Hazard Class	8
UN-Number	UN2692
Packing Group	I
EmS No.	F-A, S-B
Description	UN2692, Boron tribromide, 8, I

ADR

Proper Shipping Name	Boron tribromide
Hazard Class	8
UN-Number	UN2692
Packing Group	I
Classification Code	C1
Description	UN2692 Boron tribromide, 8, I

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Risk and Process Safety Management Programs

This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68.

This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Boron tribromide	X	X	X		X

International Regulations

Chemical Name	Carcinogen Status	Exposure Limits
Boron tribromide		Mexico: Ceiling 1 ppm Mexico: Ceiling 10 mg/m ³

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

E Corrosive material

D1A Very toxic materials

**16. OTHER INFORMATION**

Prepared By Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Issuing Date 29-Mar-2012

Revision Date

Revision Number 0

Revision Note Initial Release.

<u>NFPA</u>	Health Hazard 3	Flammability 0	Stability 0	Physical and Chemical Hazards -
<u>HMIS</u>	Health Hazard 3	Flammability 0	Physical Hazard 0	Personal Protection -

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.

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End of Safety Data Sheet