



HYDROGEN BROMIDE

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **HYDROGEN BROMIDE**

Product Code(s) **G-39, 1012**

UN-No **UN1048**

Recommended Use **Compressed gas.**

Synonyms **Anhydrous Hydrobromic Acid**

Supplier Address **Linde LLC
575 Mountain Ave.
Murray Hill, NJ 07974
Phone: 908-464-8100
www.lindeus.com**

**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**

**Linde Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
Phone: 905-501-1700
www.lindecana.com**

For additional product information contact your local customer service.

Chemical Emergency Phone
Number

Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Fatal if inhaled.
Corrosive
The product causes burns of eyes, skin and mucous membranes
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance Colorless

Physical State Compressed gas.

Odor Pungent

OSHA Regulatory Status

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects

Principle Routes of Exposure	Eye contact. Skin contact. Inhalation.
Acute Toxicity	
Inhalation	Fatal if inhaled. 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. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might occur.
Eyes	Gas can cause irritation. Corrosive to the eyes and may cause irreversible eye damage.
Skin	Gas can cause irritation. Contact with liquid causes severe corrosive action. Hydrogen bromide reacts rapidly with water to form hydrobromic acid. Hydrobromic acid burns exhibit severe pain, redness, possible swelling and early necrosis.
Skin Absorption Hazard	No known hazard in contact with skin.
Ingestion	Not an expected route of exposure. Ingestion causes burns of the upper digestive and respiratory tract.
Chronic Effects	Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen. Avoid repeated exposure. Possible risks of irreversible effects.
Aggravated Medical Conditions	Skin disorders. Pre-existing eye disorders. Respiratory disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Hydrogen bromide	10035-10-6	> 99	HBr

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. Remove contact lenses, if present, after the first 5 minutes, then continue 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. Any physical exertion during this period should be discouraged as it may increase the severity of the pulmonary edema or chemical pneumonitis. Bed rest is indicated.
Ingestion	None under normal use. Call a POISON CENTER or doctor/physician if exposed or you feel unwell.

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	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
<u>Explosion Data</u>	
Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	None
Specific Hazards Arising from the Chemical	Reacts with moisture to produce 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. Ensure adequate ventilation. Use personal protective equipment. Avoid contact with skin, eyes and clothing.
Environmental Precautions	Prevent spreading of vapors through sewers, ventilation systems and confined areas. Prevent product from entering drains.
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	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	Use only in ventilated areas. Never attempt to lift a cylinder by its valve protection cap. Most metals corrode rapidly with wet hydrogen bromide. Hastelloy C, Nickel, Monel, Copper-nickel alloys and copper-tin alloys as well as nickel-chromium alloys offer the best resistance to hydrogen bromide corrosion. Kel-F® and Teflon® are best for gasketing materials. Do not use Buna S®, Buna N® and Neoprene.
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Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use backflow preventive device in piping. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. "NO SMOKING" signs should be posted in storage and use areas.

Use an adjustable strap wrench to remove over-tight or rusted caps. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

Storage

Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Hydrogen bromide 10035-10-6	Ceiling: 2 ppm	TWA: 3 ppm TWA: 10 mg/m ³	IDLH: 30 ppm Ceiling: 3 ppm Ceiling: 10 mg/m ³

NIOSH IDLH: Immediately Dangerous to Life or Health

Other Exposure Guidelines Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Engineering Measures Eyewash stations. Showers. Ventilation systems. Exhaust gas should be vented to a gas treatment system.

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. (Teflon® is generally effective for exposures longer than 4 hours).

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 airline respirator with escape cylinder or self contained breathing apparatus for oxygen-deficient atmospheres (<19.5%).
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	Colorless.	Odor	Pungent.
Odor Threshold	2-5 ppm	Physical State	Compressed gas
Flash Point	No information available.	Autoignition Temperature	No information available
Decomposition Temperature	No information available	Boiling Point/Range	-66.9°C / -88.1°F
Freezing Point	-86.9°C / -124.4°F	Molecular Weight	80.912
Water Solubility	0.49 (vol/vol @ 20°C and 1 atm)	Evaporation Rate	No information available
Vapor Pressure	335 PSIA @ 70°F	Vapor Density	2.79 (air = 1)
Gas Density	3.636 kg/m ³ @ 21.1°C	VOC Content (%)	Not applicable
Critical Pressure	1234 psia (8508 kPa abs)	Flammability Limits in Air	
		Upper	Not applicable
		Lower	Not applicable

10. STABILITY AND REACTIVITY

Stability	Stable under recommended storage conditions.
Incompatible Products	Acids. Bases. Strong oxidizing agents. Ammonia. Ozone. Fluorine. Ferric oxide. Halogens.
Conditions to Avoid	Exposure to air or moisture over prolonged periods.
Hazardous Decomposition Products	Thermal decomposition can lead to release of irritating gases and vapors.
Hazardous Reactions	An explosive reaction can occur with 1,2-Diaminoethaneminediperoxochromium.
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

<u>Acute Toxicity</u>	
LD50 Oral:	No information available.
LD50 Dermal:	No information available.
LC50 Inhalation:	Per CGA P-20:2860 ppm/1 hr. (Rat)
Inhalation	The current ACGIH TLV-Ceiling of 2 ppm is based on the results of controlled exposures of human volunteers and is expected to minimize transient irritation and complaints. An odor threshold of 2 ppm has been reported.
Eye Contact	Causes burns.
Skin Contact	Causes burns.
Repeated Dose Toxicity	No information available.

Chronic Toxicity

Chronic Toxicity	Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen. Avoid repeated exposure. Possible risks of irreversible effects.
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	Eyes. Respiratory system. Skin.

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	Hydrogen bromide, anhydrous
Hazard Class	2.3
Subsidiary Class	8
UN-No	UN1048
Description	UN1048,Hydrogen bromide, anhydrous,2.3,(8),PG None
Additional Description:	"Toxic-Inhalation Hazard Zone C".
Additional Marking Requirements:	"Inhalation Hazard".
Emergency Response Guide Number	125

TDG

Proper Shipping Name	Hydrogen bromide, anhydrous
Hazard Class	2.3
Subsidiary Class	(8)
UN-No	UN1048
Description	UN1048, HYDROGEN BROMIDE, ANHYDROUS, 2.3(8)

MEX

Proper Shipping Name	Hydrogen bromide, anhydrous
Hazard Class	2.3
Subsidiary Class	8
UN-No	UN1048
Description	UN1048 Hydrogen bromide, anhydrous, 2.3

IATA

UN-No	UN1048
Proper Shipping Name	Hydrogen bromide, anhydrous
Hazard Class	2.3
Subsidiary Class	8
ERG Code	2CP
Description	UN1048, Hydrogen bromide, anhydrous, 2.3(8)
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	No information available.

IMDG/IMO

Proper Shipping Name	Hydrogen bromide, anhydrous
Hazard Class	2.3
Subsidiary Class	8
UN-No	UN1048
EmS No.	F-C, S-U
Description	UN1048, Hydrogen bromide, anhydrous, 2.3(8)

ADR

Proper Shipping Name	Hydrogen bromide, anhydrous
Hazard Class	2.3
UN-No	UN1048
Classification Code	2TC
Description	UN1048 Hydrogen bromide, anhydrous, 2.3,
ADR/RID-Labels	8

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	Yes
Reactive Hazard	No

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, contains one or more regulated substances with specified thresholds under 40 CFR Part 68 or regulated as a highly hazardous chemical pursuant to the 29 CFR Part 1910.110 with specified thresholds:

Chemical Name	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances	U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals
Hydrogen bromide			5000 lb

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
Hydrogen bromide	X	X	X		X

International Regulations

Chemical Name	Carcinogen Status	Exposure Limits
Hydrogen bromide		Mexico: Ceiling= 3 ppm Mexico: Ceiling= 10 mg/m ³

Canada

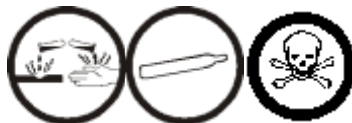
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

E Corrosive material

A Compressed gases

D1A Very toxic materials

**16. OTHER INFORMATION**

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

Issuing Date 09-Jul-2010

Revision Date

Revision Number 0

Revision Note Initial Release.

<u>NFPA</u>	Health Hazard 3	Flammability 0	Stability 0	Physical and Chemical Hazards W1**
<u>HMIS</u>	Health Hazard 3	Flammability 0	Physical Hazard 1	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