< 0.8% DIBORANE in NITROGEN
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name < 0.8% DIBORANE in NITROGEN
Product Code(s) G-26
UN-Number UN1956
Recommended Use Electronics.

Supplier Address*
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

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.lindecanada.com

* May include subsidiaries or affiliate companies/divisions.
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

WARNING!

Emergency Overview
May be harmful if inhaled
May cause skin, eye, and respiratory tract irritation
May cause central nervous system depression
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance Colorless
Physical State Compressed gas.
Odor Slight sweet

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
May be harmful if inhaled. May cause irritation. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination. Odor will not provide sufficient warning of exposure. Potentially dangerous amounts may be inhaled before odor is detected.

Eyes
May cause irritation.

Skin
May cause irritation.

Skin Absorption Hazard
No known hazard by skin absorption.

Ingestion
Not an expected route of exposure.

Chronic Effects
No known effect based on information supplied.

Aggravated Medical Conditions

Environmental Hazard
See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Volume %</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
<td>&gt; 99.2</td>
<td>N₂</td>
</tr>
<tr>
<td>Diborane</td>
<td>19287-45-7</td>
<td>&lt; 0.8</td>
<td>B₂H₆</td>
</tr>
</tbody>
</table>

Additional information: Composition listed covers broad ranges rather than exact percentages for specific products.

4. FIRST AID MEASURES

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. If irritation persists, call a physician.

Skin Contact
Wash off immediately with soap and plenty of water for at least 15 minutes. Remove and wash contaminated clothing before re-use. Get medical attention if irritation persists.

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
None under normal use. Get medical attention immediately if symptoms occur.

Notes to Physician
Treat symptomatically.

Protection of First-aiders
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. FIRE-FIGHTING MEASURES

Flammable Properties
Not flammable. Diborane concentrations less than or equal to 0.8% in Nitrogen are considered non-flammable (CGA Pamphlet P-23).
Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Hazardous Combustion Products
Boron compounds.

Explosion Data

Sensitivity to Mechanical Impact
None

Sensitivity to Static Discharge
None

Specific Hazards Arising from the Chemical
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.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Avoid contact with skin, eyes and clothing.

Environmental Precautions
Prevent spreading of vapors through sewers, ventilation systems and confined areas.

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
Ventilate the area.

7. HANDLING AND STORAGE

Handling
Handle this gas mixture only in sealed and purged systems. All areas where this gas mixture is used should be monitored with very sensitive gas detection instruments. Detection of concentrations below 50% of the PEL (0.1 ppm) of Diborane should trigger immediate response and corrective action. Detection of higher levels should initiate an alarm calling for evacuation of all personnel with the potential to be exposed.

Use only in ventilated areas. Never attempt to lift a cylinder by its valve protection cap. 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.

Use an adjustable strap wrench to remove over-tight or rusted caps. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. 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.

For additional recommendations consult Compressed Gas Association’s (CGA) Safety Bulletin SB-2, Oxygen-Deficient Atmospheres.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane</td>
<td>TWA: 0.1 ppm</td>
<td>TWA: 0.1 ppm</td>
<td>IDLH: 15 ppm</td>
</tr>
<tr>
<td>19287-45-7</td>
<td></td>
<td></td>
<td>TWA: 0.1 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA: 0.1 ppm</td>
</tr>
</tbody>
</table>

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. 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
Showers. Eyewash stations. 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
Wear protective eyewear (safety glasses).

Skin and Body Protection
Work gloves and safety shoes are recommended when handling cylinders.

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. For exposures above IDLH, an additional escape bottle is required.

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.
9. PHYSICAL AND CHEMICAL PROPERTIES

Product Information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Colorless.</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>2.5 ppm (Diborane)</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No information available. (For Diborane)</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>98%</td>
</tr>
<tr>
<td>Lower</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

The following information is for the NON-INERT components of this mixture:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Boiling Point (°C)</th>
<th>Melting Point (°C)</th>
<th>Molecular Weight</th>
<th>Evaporation Rate</th>
<th>Water Solubility</th>
<th>Vapor Pressure (mmHg)</th>
<th>Vapor Density (Air=1) (Kg/m³@20°C)</th>
<th>Gas Density (Kg/m³@20°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane</td>
<td>-93</td>
<td>-165</td>
<td>27.69</td>
<td>-</td>
<td>No information available.</td>
<td>224 @ -112 °C</td>
<td>1.0</td>
<td>1.159</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>-196</td>
<td>-210</td>
<td>28.01</td>
<td>-</td>
<td>0.023 (vol/vol @ 20°C and 1 atm)</td>
<td>Above critical temperature</td>
<td>0.97</td>
<td>1.165</td>
</tr>
</tbody>
</table>

The following information is for the INERT components that may be part of this mixture:

10. STABILITY AND REACTIVITY

Stability
Unstable at elevated temperatures. Diborane mixture storage time should be minimized.

Incompatible Products

Conditions to Avoid
Exposure to air or moisture over prolonged periods.

Hazardous Decomposition Products
Hydrogen, higher boranes at room temperature.

Hazardous Polymerization
Diborane will polymerize to form liquid pentaborane. No information was available for reaction rate.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Product Information

<table>
<thead>
<tr>
<th>Dosage Form</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 Oral</td>
<td>No information available.</td>
</tr>
<tr>
<td>LD50 Dermal</td>
<td>No information available.</td>
</tr>
<tr>
<td>LC50 Inhalation</td>
<td>Refer to CGA P-20 for classification procedures for toxic gas mixtures.</td>
</tr>
</tbody>
</table>

Repeated Dose Toxicity
No information available.

Component Information
Chronic Toxicity

Chronic Toxicity: None known.

Carcinogenicity: Contains no ingredient listed as a carcinogen.

Irritation: No information available.

Sensitization: No information available.

Reproductive Toxicity: No information available.

Developmental Toxicity: Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

Synergistic Materials: None known.


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: Compressed gas, n.o.s.
Hazard Class: 2.2
Subsidiary Class: None
UN-Number: UN1956
Description: UN1956, Compressed gas, n.o.s. (Diborane, Nitrogen), 2.2
Emergency Response Guide Number: 126

TDG
Regulatory Information

International Inventories

- TSCA: Complies
- DSL: Complies
- EINECS/ELINCS: Complies

Legend

- TSCA: United States Toxic Substances Control Act Section 8(b) Inventory
- DSL/NDSL: 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

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Health Hazard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Health Hazard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Hazard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudden Release of Pressure Hazard</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Reactive Hazard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances</th>
<th>U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances</th>
<th>U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane</td>
<td>2500 lbs</td>
<td></td>
<td>100 lb</td>
</tr>
</tbody>
</table>

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, contains one or more 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):

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
<th>Extremely Hazardous Substances RQs</th>
<th>TPQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane</td>
<td></td>
<td>100 lb</td>
<td>100 lb TPQ</td>
</tr>
</tbody>
</table>

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

International Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Carcinogen Status</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane</td>
<td></td>
<td>Mexico: TWA= 0.1 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: TWA= 0.1 ppm</td>
</tr>
</tbody>
</table>

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
A Compressed gases

16. OTHER INFORMATION

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

Issuing Date 10-Feb-2011

Revision Date

Revision Number 0

Revision Note Initial Release.

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Stability</th>
<th>Physical and Chemical Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Physical and Chemical Hazards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>Personal Protection</td>
</tr>
</tbody>
</table>

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