1 Identification of Substance

Product Details
Trade Name: Xenon difluoride

Manufacturer/Supplier:
Linde Gas Puerto Rico, Inc. Linde Canada Limited
575 Mountain Avenue Las Palmas Village 5860 Chedworth Way
Murray Hill, NJ 07974 USA Road No. 869, Street No. 7 Mississauga, Ontario L5R 0A2
ph: 787-754-7445

Information Department:

Emergency Information:
For U.S & Puerto Rico, CHEMTREC 24-HOUR EMERGENCY TELEPHONE NUMBER: 800-424-9300
For Canada, 24-HOUR EMERGENCY TELEPHONE NUMBER: 905-501-0802

2 Hazards Identification

Hazard Description:
White, odorless, solid crystals. WARNING - EXPLOSIVE IN CONTACT WITH COMBUSTIBLE MATERIALS. Strong oxidizer. Nonflammable. Contact with organic materials may result in spontaneous ignition. In the presence of water or moist air, xenon difluoride decomposes to toxic compounds.

Emergency Overview:
EMERGENCY OVERVIEW: Corrosive to exposed tissues. Inhalation of vapors may result in pulmonary edema and chemical pneumonitis. May cause corrosive burns to eyes, skin, respiratory and digestive tracts. Reacts violently and decomposes to toxic compounds on contact with moisture and moist air. Product should be handled only in controlled conditions, by trained personnel (see section 7).

CLASSIFICATION SYSTEM:

NFPA Ratings (scale 0 - 4)

Health = 3
Fire = 0
Instability = 2
Special = OX

The substance possesses oxidizing properties.

HMIS Ratings (scale 0 - 4)

Health = 3
Fire = 0
Physical Hazard = 2

3 Composition/Data on Components

CAS No. Description
13709-36-9 Xenon difluoride

IDENTIFICATION NUMBER(S): EINECS Number: 237-251-2
Trade Name: Xenon difluoride

4 First aid measures

After Inhalation:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND ADVISED OF THE FIRE AND EXPLOSION HAZARDS ASSOCIATED WITH A RELEASE. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, give supplemental oxygen. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and, if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Seek immediate medical attention. Further treatment should be symptomatic and supportive.

After skin contact:
Remove contaminated clothing as rapidly as possible. Flush affected areas with copious amounts of water for at least fifteen minutes. Seek immediate medical attention. Dermal contact may cause mild to severe irritation or chemical burns.

After eye contact:
PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Immediately flush contaminated eye(s) with copious amounts of lukewarm water. Part eyelids with fingers to assure complete flushing. Continue flushing for at least 30 minutes while obtaining immediate medical attention. Xenon difluoride contact with the eyes may cause mild to severe irritation, or chemical burns.

After ingestion:
PROMPT MEDICAL ATTENTION IS MANDATORY. CALL LOCAL POISON CONTROL CENTER. Ingestion of xenon difluoride is not a likely anticipated source of exposure. Ingestion of the product may cause irritation or burns to the mouth and throat. If vomiting occurs, position the patient's body to prevent mucus from entering the respiratory tract.

Medical conditions aggravated by exposure:
Pre-existing dermatitis, other skin conditions and respiratory disorders may be aggravated by over-exposure to xenon difluoride.

5 Fire fighting measures

Flammable Properties:
Product is nonflammable, but is a very strong and potent oxidizing agent. It may explode or ignite on contact with combustible materials.

Suitable extinguishing agents:
None required for xenon difluoride. Use extinguishing media appropriate for the combustible material present. Product is reactive in contact with water, and will generate toxic compounds. Use caution when considering the use of water spray to extinguish flames.

Special hazards caused by the material, its products of combustion or resulting gases:
Product reacts with sprayed water to generate toxic gases.

Protective equipment:
Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear with additional chemical protective clothing as necessary to prevent exposure.

6 Accidental release measures

Person-related safety precautions:
Evacuate all personnel from affected area. Deny entry to unauthorized and unprotected personnel. Appropriate protective equipment is essential to prevent exposure (see Section 8). A leak near
incompatible or combustible materials may create a fire or explosion hazard.

If necessary, conduct air monitoring for xenon difluoride particulate in the spill area. Ensure that exposure levels are below occupational health standards prior to re-admitting personnel.

**Measures for cleaning/collection:**
Sweep or clean up spilled solid product. If necessary, thoroughly rinse the spill area and contaminated surfaces with a calcium carbonate or calcium oxide solution. Place spilled product and all clean-up materials in a dry plastic container and dispose in accordance with local waste regulations (see section 13). Dispose of contaminated clothing or other materials in accordance with pertinent regulations.

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### 7 Handling and storage

**HANDLING:**
Information about protection against explosions and fires:
Protect containers from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas, emergency exits, flammables, and all combustibles and other incompatible materials. Maintain storage temperature below 125°F. Product is contained in a dry nitrogen atmosphere, in PTFE (plastic) containers, inside an outer container for further protection to minimize the risk of contamination or damage. Containers should be stored so that the inside container is not damaged or broken.

Post "NO SMOKING OR OPEN FLAMES" signs in storage and use areas. There should be no sources of ignition where this product is used or stored. See NFPA Code 430 for further storage recommendations.

**STORAGE:**
Specific applications:
Xenon difluoride should only be handled in an inert "glove box" or under a blanket of an inert gas such as nitrogen. Do not use or store product in or with glass. Packaging to contain XeF2 should be dry and free of hydrocarbons. Fluorine "passivation" may also be indicated.

Security:
Store container in a secured area. Limit access to authorized personnel only. Report any incidents involving thefts, misuse, or inventory shortages to law enforcement and the supplier. Security shall be provided in accordance with all local, state and federal regulations.

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### 8 Exposure controls and personal protection

**Engineering Controls:**
Use a hood with forced ventilation, local exhaust ventilation, and/or engineering controls to ensure potential exposure to below permissible exposure limits for fluorides.

**Components with limit values that require monitoring at the workplace:**

<table>
<thead>
<tr>
<th>13709-36-9 xenon difluoride</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
</tr>
<tr>
<td>REL</td>
</tr>
<tr>
<td>TLV</td>
</tr>
</tbody>
</table>

(Contd. on page 4)
Trade Name: Xenon difluoride

PERSONAL PROTECTIVE EQUIPMENT:

Breathing equipment:
Positive pressure NIOSH-approved air-supplying respirator system (SCBA or airline/escape bottle) with a full-face mask and at a minimum of Grade D air should be available for emergency use.

Hand/skin protection:
Appropriate protective and chemical-resistant gloves. For materials of construction, consult the protective clothing manufacturers for specific guidance.

Eye/face protection:
Safety goggles or glasses as appropriate for the job. Faceshields are recommended when handling or transfer of XeF2 solid might generate dust or particulate.

Other/General Protection:
Safety shoes or other footwear appropriate for the job, safety shower and emergency eyewash station.

9 Physical and chemical properties

GENERAL INFORMATION:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Solid</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless to white crystals</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
</tbody>
</table>

CHANGE IN CONDITION:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point/Melting range</td>
<td>130-135°C (266-275°F)</td>
</tr>
<tr>
<td>Boiling point/Boiling range</td>
<td>sublimes</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Flammability (solid, gaseous): Product is not flammable.

Explosion limits:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidizing properties</td>
<td>Product is a strong oxidizer.</td>
</tr>
</tbody>
</table>

Vapor pressure at 20°C (68°F): 5 hPa (4 mm Hg)

Density:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>Not determined.</td>
</tr>
</tbody>
</table>

Solubility in / Miscibility with Water:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soluble in water (25 g/L at 0°C) and hydrolyzes to form hydrofluoric acid.</td>
<td></td>
</tr>
</tbody>
</table>

10 Stability and reactivity

Thermal decomposition / Conditions to be avoided:
In the presence of water or moist air, XeF2 forms hydrogen fluoride or hydrochloric acid. Do not expose product or its container to water or moisture. Use and store below 125°F.

Materials to be avoided:
Water, moisture, organic materials, flammable and combustible materials, and some metals.

Dangerous reactions: None

(Contd. on page 5)
Trade Name: Xenon difluoride

Dangerous products of decomposition:
Hydrogen and toxic fluoride compounds may be generated in certain reactions. Hydrolysis yields hydrochloric and boric acids. Thermal decomposition may produce toxic hydrogen chloride gas.

11 Toxicological information

ACUTE TOXICITY

LD/LC50 values that are relevant for classification:

<table>
<thead>
<tr>
<th>Route</th>
<th>LD50</th>
<th>LC50/2 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>90 mg/kg (mouse)</td>
<td></td>
</tr>
<tr>
<td>Inhalative</td>
<td>445 mg/m3 ppm (mouse)</td>
<td></td>
</tr>
</tbody>
</table>

PRIMARY IRRITANT EFFECT:

On the skin/eye:
Corrosive and irritating to the skin and all living tissue. Fluorine hydrolyzes very rapidly yielding hydrofluoric acid. Skin burns and mucosal irritation are like that from exposure to acids. Toxic level exposure to dermal tissues causes acid-like burns resulting in early necrosis and scarring. Extended low-level systemic absorption of fluorides may cause fluorosis, an abnormal calcification pattern of the skeletal system.

On the eye:
Corrosive and irritating to the eyes. Contact with the liquid or vapor causes painful burns and ulcerations. Burns to the eyes result in lesions and possible loss of vision.

On inhalation:
Corrosive and irritating to the upper and lower respiratory tracts and all mucosal tissue. Symptoms include lacrymation, cough, labored breathing and excessive salivary and sputum formation. Excessive irritation may cause chemical pneumonitis and pulmonary edema, which may be fatal.

Additional toxicological information:
Upon ingestion, the product is corrosive and irritating. Similar effects to those noted for skin exposure (above) may be experienced.

12 Ecological information

Environmental impact:
Ecotoxicity values were unavailable. Toxic effects are expected to be similar to those seen in humans and test animals.

General notes: Must not reach bodies of water or drainage ditch undiluted or unneutralized.

13 Disposal considerations

PRODUCT:
Recommendation:
Dispose of residual waste or unused quantities in accordance with applicable regulations for environmental quality and safety. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed in Section 1.

UNCLEANED PACKAGING:
Recommendation: Same as above.

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**Trade Name:** Xenon difluoride

### 14 Transport information

#### DOT regulations:

- **Hazard class:** 5.1
- **Identification number:** UN1479
- **Packing group:** II
- **Proper shipping name (technical name):** OXIDIZING SOLID, N.O.S. (xenon difluoride)
- **Label:** 5.1

#### Land transport ADR/RID (cross-border):

- **ADR/RID class:** 5.1 Oxidizing substances
- **Danger code (Kemler):** 50
- **UN-Number:** 3085
- **Label:** 5.1
- **Description of goods:** 3085 OXIDIZING SOLID, CORROSIVE, N.O.S. (xenon difluoride)

#### Maritime transport IMDG:

- **IMDG Class:** 5.1
- **UN Number:** 3085
- **Label:** 5.1
- **Packaging group:** II
- **Proper shipping name:** OXIDIZING SOLID, CORROSIVE, N.O.S. (xenon difluoride)

#### Air transport ICAO-TI and IATA-DGR:

- **ICAO/IATA Class:** 5.1
- **UN/ID Number:** 3085
- **Label:** 5.1
- **Proper shipping name:** OXIDIZING SOLID, CORROSIVE, N.O.S. (xenon difluoride)

### 15 Regulations

**SARA**

- **Section 355 (extremely hazardous substances):** Substance is not listed.
- **Section 313 (Specific toxic chemical listings):** Substance is not listed.

(Contd. on page 7)
Trade Name: Xenon difluoride

TSCA (Toxic Substance Control Act):
The substance is listed.

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PROPOSITION 65:
Chemicals known to cause cancer: Substance is not listed.
Chemicals known to cause reproductive toxicity for females: Substance is not listed.
Chemicals known to cause reproductive toxicity for males: Substance is not listed.
Chemicals known to cause developmental toxicity: Substance is not listed.

CARCINOGENICITY CATEGORIES:
EPA (Environmental Protection Agency) Substance is not listed.
IARC (International Agency for Research on Cancer) Substance is not listed.
NTP (National Toxicology Program) Substance is not listed.

TLV (Threshold Limit Value established by ACGIH)
| 13709-36-9 | xenon difluoride |

NIOSH (National Institute for Occupational Safety and Health) Substance is not listed.
OSHA (Occupational Safety & Health Administration) Substance is not listed.

Product related hazard informations:
The product has been classified and marked in accordance with regulations on hazardous materials.

Risk phrases: 34 Causes burns.

Safety phrases:
8  Keep container dry.
26  In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
45  In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

16 Other information
This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Department Issuing MSDS: Linde Safety, Health, Environment and Quality
Contact: Refer to Linde web site for contact and product information at www.lindeus.com

Sources: (Contd. on page 8)
Trade Name: Xenon difluoride

ABBREVIATIONS AND ACRONYMS:

ACGIH: American Conference of Governmental Industrial Hygienists
ADR/RID: Agreement on Dangerous Goods by Road/Regulation concerning the International Transport of Goods by Rail
CAS: Chemical Abstracts Service
DOT: US Department of Transportation
EINECS: European Inventory of Existing Chemical Substances
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
HMIS: Health Management Information System
IATA: International Air Transport Organization
IATA-DGR: Dangerous Goods Regulations by the International Air Transport Organization
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the International Civil Aviation Organization
IMDG: International Marine Code for Dangerous Goods
NFPA: National Fire Protection Association

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