

### SECTION 1: Product and company identification

#### 1.1. Product identifier

Product form	: Substance
Substance name	: 1,3-butadiene, buta-1,3-diene
CAS-No.	: 106-99-0
Formula	: C <sub>4</sub> H <sub>6</sub>
Other means of identification	: Biethylene; Butadiene; Vinyl Ethylene

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	: Industrial and professional use
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#### 1.3. Details of the supplier of the safety data sheet

Linde Inc.  
10 Riverview Drive  
Danbury, CT 06810-6268, USA  
www.lindeus.com

Electronics gas products 1-800-932-0624 or 1-908-329-9700  
Linde Inc. 1-844-44LINDE (1-844-445-4633)

For additional product information contact your local customer service.

#### 1.4. Emergency telephone number

Emergency number	: Onsite Emergency: 1-800-645-4633
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CHEMTREC, 24 hr/day 7 days/week  
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887  
(collect calls accepted, Contract 17729)

### SECTION 2: Hazard identification

#### 2.1. Classification of the substance or mixture

##### GHS-US classification

Flam. Gas 1	H220
Press. Gas (Liq.)	H280
Muta. 1B	H340
Carc. 1A	H350
Aquatic Acute 3	H402

#### 2.2. Label elements

##### GHS US labelling

Hazard pictograms (GHS US)



Signal word (GHS US)

: Danger

Hazard statements (GHS US)

: H220 - EXTREMELY FLAMMABLE GAS  
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED  
H340 - MAY CAUSE GENETIC DEFECTS.  
H350 - MAY CAUSE CANCER (Inhalation).  
H361 - SUSPECTED OF DAMAGING FERTILITY OR THE UNBORN CHILD  
H402 - HARMFUL TO AQUATIC LIFE  
CGA-HG01 - MAY CAUSE FROSTBITE.  
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR

Precautionary statements (GHS US)

: P201 - Obtain special instructions before use.  
P202 - Do not handle until all safety precautions have been read and understood.

# 1,3-butadiene, buta-1,3-diene

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P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
 P261 - Avoid breathing gas, vapours  
 P262 - Do not get in eyes, on skin, or on clothing.  
 P273 - Avoid release to the environment.  
 P280 - Wear protective gloves/protective clothing/eye protection/face protection.  
 P271+P403 - Use and store only outdoors or in a well-ventilated place.  
 P377 - LEAKING GAS FIRE: Do not extinguish, unless leak can be stopped safely.  
 P381 - Eliminate all ignition sources if safe to do so.  
 P405 - Store locked up.  
 P501 - Dispose of contents/container in accordance with container Supplier/owner instructions  
 P308+P313 - If exposed or concerned: Get medical advice/attention.  
 P302, P336, P315 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.  
 CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).  
 CGA-PG06 - Close valve after each use and when empty.  
 CGA-PG05 - Use a back flow preventive device in the piping.  
 CGA-PG10 - Use only with equipment rated for cylinder pressure.

### 2.3. Other hazards

Other hazards which do not result in classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Name	Product identifier	%
1,3-butadiene, buta-1,3-diene (Main constituent)	(CAS-No.) 106-99-0	100

### 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.

First-aid measures after skin contact : The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

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, both acute and delayed

No additional information available

### 4.3. Indication of any immediate medical attention and special treatment needed

None. Obtain medical assistance.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Carbon dioxide, Dry chemical, Water spray or fog.

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### 5.2. Special hazards arising from the substance or mixture

- Fire hazard : EXTREMELY FLAMMABLE GAS. If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.
- Explosion hazard : EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents.
- Reactivity : No reactivity hazard other than the effects described in sub-sections below.

### 5.3. Advice for firefighters

- Firefighting instructions : 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 OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.
- Protection during firefighting : Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.
- Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Wear gas tight chemically protective clothing in combination with self contained breathing apparatus.
- 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.
- Stop flow of product if safe to do so.
- Use water spray or fog to knock down fire fumes if possible.
- Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
- Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by TC.).

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

- General measures : **Danger: Flammable, liquefied gas.** FORMS EXPLOSIVE MIXTURES WITH AIR. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

#### 6.1.1. For non-emergency personnel

No additional information available

#### 6.1.2. For emergency responders

No additional information available

### 6.2. Environmental precautions

Try to stop release. Reduce vapour with fog or fine water spray. Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with container supplier/owner instructions.

### 6.3. Methods and material for containment and cleaning up

No additional information available

### 6.4. Reference to other sections

See also sections 8 and 13.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Precautions for safe handling : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.

Ensure equipment is adequately grounded.

Leak-check system with soapy water; never use a flame.

Wear leather safety gloves and safety shoes when handling cylinders. Protect containers 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 only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g. NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

**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.

#### 7.3. Specific end use(s)

None.

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

1,3-butadiene, buta-1,3-diene (106-99-0)		
ACGIH	ACGIH OEL TWA [ppm]	2 ppm
USA OSHA	OSHA PEL TWA [2]	1 ppm
USA OSHA	OSHA PEL STEL [2]	5 ppm (see 29 CFR 1910.1051)
USA IDLH	IDLH [ppm]	2000 ppm (10% LEL)

#### 8.2. Exposure controls

Appropriate engineering controls : This product must be confined with vapor-tight equipment. With this confinement, vapors should not be released, and local exhaust should be satisfactory. An explosion-proof system is acceptable. Ensure that any venting of material is in compliance with international, federal/national, state/provincial, and local regulations.

Hand protection : Wear Protective gloves made of PVC..

Eye protection : Wear safety glasses with side shields. Wear goggles when transfilling or breaking transfer connections. Provide readily accessible eye wash stations and safety showers.

# 1,3-butadiene, buta-1,3-diene

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Skin and body protection	: Wear work gloves and metatarsal shoes for cylinder handling. Protective equipment where needed. Select in accordance with OSHA 29 CFR 1910.132, 1910.136, and 1910.138.
Respiratory protection	: When workplace conditions warrant respirator use, follow a respiratory protection program that meets or exceeds the requirements of the appropriate Health and Safety Regulations. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Environmental exposure controls	: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Refer to local regulations for restriction of emissions to the atmosphere.
Other information	: Consider the use of flame resistant anti-static safety clothing. Wear safety shoes while handling containers. Keep suitable chemically resistant protective clothing readily available for emergency use. Wear leather safety gloves and safety shoes when handling cylinders.

### SECTION 9: Physical and chemical properties

#### 9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Colourless gas.
Molecular mass	: 54 g/mol
Colour	: Colourless.
Odour	: Mildly aromatic. Poor warning properties at low concentrations.
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure. 1 mg/m <sup>3</sup> (Hellman and Small)
pH	: Not applicable.
Relative evaporation rate (butylacetate=1)	: > 25
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -109 °C
Freezing point	: No data available
Boiling point	: -4.4 °C
Flash point	: -76.1 °C (TCC ASTM D56)
Critical temperature	: 151.9 °C
Auto-ignition temperature	: 418.9 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: 2 – 11.5 vol %
Vapour pressure	: 240 kPa
Critical pressure	: 4330 kPa
Relative vapour density at 20 °C	: No data available
Relative density	: 0.65
Density	: 0.6149 g/cm <sup>3</sup> (at 25 °C)
Relative gas density	: 1.9
Solubility	: Water: 1025 mg/l
Partition coefficient n-octanol/water (Log Pow)	: 1.99
Partition coefficient n-octanol/water (Log Kow)	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.
Oxidizing properties	: None.
Explosive limits	: No data available

#### 9.2. Other information

Gas group	: Press. Gas (Liq.)
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Additional information : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

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

#### 10.2. Chemical stability

May polymerise. Inhibitor usually added. Stable under normal conditions.

#### 10.3. Possibility of hazardous reactions

May occur. May react violently with oxidants. Can form explosive mixture with air.

#### 10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Rusty iron. Exposure to air may form spontaneously flammable or explosive peroxides.

#### 10.5. Incompatible materials

Oxidizer. Acids. Halogens. Sulphur dioxide.

#### 10.6. Hazardous decomposition products

Thermal decomposition may produce : Carbon monoxide. Carbon dioxide.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified  
 Acute toxicity (dermal) : Not classified  
 Acute toxicity (inhalation) : Not classified

1,3-butadiene, buta-1,3-diene ( f )106-99-0	
LD50 oral rat	5480 mg/kg
LC50 Inhalation - Rat	285 g/m <sup>3</sup> (Exposure time: 4 h)
LC50 Inhalation - Rat [ppm]	220000 ppm/1h
ATE US (oral)	5480 mg/kg bodyweight
ATE US (gases)	110000 ppmv/4h
ATE US (vapours)	285 mg/l/4h
ATE US (dust,mist)	285 mg/l/4h

Skin corrosion/irritation : Not classified  
 pH: Not applicable.  
 Serious eye damage/irritation : Not classified  
 pH: Not applicable.  
 Respiratory or skin sensitisation : Not classified  
 Germ cell mutagenicity : MAY CAUSE GENETIC DEFECTS.  
 Carcinogenicity : MAY CAUSE CANCER (Inhalation).

1,3-butadiene, buta-1,3-diene (106-99-0)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens

Reproductive toxicity : Not classified  
 STOT-single exposure : Not classified  
 STOT-repeated exposure : Not classified

Aspiration hazard : Not classified

### SECTION 12: Ecological information

#### 12.1. Toxicity

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

#### 12.2. Persistence and degradability

1,3-butadiene, buta-1,3-diene (106-99-0)	
Persistence and degradability	Not readily biodegradable.

#### 12.3. Bioaccumulative potential

1,3-butadiene, buta-1,3-diene (106-99-0)	
BCF - Fish [1]	13 – 19.1
Partition coefficient n-octanol/water (Log Pow)	1.99
Partition coefficient n-octanol/water (Log Kow)	Not applicable.
Bioaccumulative potential	Not expected to bioaccumulate due to the low log Kow (log Kow < 4). See section 9.

#### 12.4. Mobility in soil

1,3-butadiene, buta-1,3-diene (106-99-0)	
Mobility in soil	No data available.
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

#### 13.1. Waste treatment methods

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

### SECTION 14: Transport information

In accordance with DOT

Transport document description (DOT) : UN1010 Butadienes, stabilized, 2.1

UN-No.(DOT) : UN1010

Proper Shipping Name (DOT) : Butadienes, stabilized

Class (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115

Hazard labels (DOT) : 2.1 - Flammable gas



DOT Special Provisions (49 CFR 172.102) : T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter.

#### Additional information

Other information : No supplementary information available.

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:  
 - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

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### Transport by sea

UN-No. (IMDG)	: 1010
Proper Shipping Name (IMDG)	: BUTADIENES, STABILIZED
Class (IMDG)	: 2 - Gases
Division (IMDG)	: 2.1 - Flammable gases
EmS-No. (1)	: F-D
MFAG-No	: 116P
EmS-No. (2)	: S-U

### Air transport

UN-No. (IATA)	: 1010
Proper Shipping Name (IATA)	: Butadienes, stabilized
Class (IATA)	: 2 - Gases
Civil Aeronautics Law	: Gases under pressure/Gases flammable under pressure(Hazardous materials notice Appended Table 1 Article 194 of the Enforcement Regulations)

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

<b>1,3-butadiene, buta-1,3-diene (106-99-0)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	10 lb
SARA Section 313 - Emission Reporting	0.1 %

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

### 15.2. International regulations

#### CANADA

<b>1,3-butadiene, buta-1,3-diene (106-99-0)</b>
Listed on the Canadian DSL (Domestic Substances List)

#### EU-Regulations

<b>1,3-butadiene, buta-1,3-diene (106-99-0)</b>
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

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### 15.2.2. National regulations

#### 1,3-butadiene, buta-1,3-diene (106-99-0)

Listed on IARC (International Agency for Research on Cancer)  
 Listed introduction on Australian Industrial Chemicals Introduction Scheme (AICIS Inventory)  
 Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
 Listed on the Japanese ENCS (Existing New Chemical Substances) inventory  
 Listed on the Japanese ISHL (Industrial Safety and Health Law)  
 Listed on KECL/KECI (Korean Existing Chemicals Inventory)  
 Listed on NZIoC (New Zealand Inventory of Chemicals)  
 Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)  
 Japanese Pollutant Release and Transfer Register Law (PRTR Law)  
 Listed as carcinogen on NTP (National Toxicology Program)  
 Listed on the Canadian IDL (Ingredient Disclosure List)  
 Listed on INSQ (Mexican National Inventory of Chemical Substances)  
 Listed on EPA Hazardous Air Pollutant (HAPS)  
 Listed on the TCSI (Taiwan Chemical Substance Inventory)

### 15.3. US State regulations

#### 1,3-butadiene, buta-1,3-diene(106-99-0)

U.S. - California - Proposition 65 - Carcinogens List	Yes
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	Yes
No significant risk level (NSRL)	0.4 µg/day
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances U.S. - Pennsylvania - RTK (Right to Know) List

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### SECTION 16: Other information

#### Other information

: Prior to using any plastics, confirm their compatibility with this chemical.

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 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 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 Inc, it is the user's obligation to determine the conditions of safe use of the product.

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#### NFPA health hazard

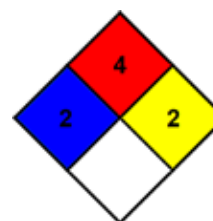
: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

#### NFPA fire hazard

: 4 - Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and burn readily.

#### NFPA instability

: 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.



SDS US (GHS HazCom 2012) - Linde 2022

*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.*