

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Mixture
 Product name : 23 Components in n-Butane
 Product code : SG-2024-01413

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

Use of the substance/mixture : Test gas/Calibration gas.

1.3. Details of the supplier of the safety data sheet

Air Liquide
 2700 Post Oak Boulevard
 Houston, TX 77056 - USA
 T 1-800-819-1704
www.us.airliquide.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Gas 1 H220
 Liquefied gas H280
 Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS02

GHS04

Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H220 - Extremely flammable gas
 H280 - Contains gas under pressure; may explode if heated
 OSHA-H01 - May displace oxygen and cause rapid suffocation
 CGA-HG01 - May cause frostbite
 CGA-HG04 - May form explosive mixtures with air
 CGA-HG16 - Extended exposure to gas reduces the ability to smell sulfides.

Precautionary statements (GHS-US) :

P202 - Do not handle until all safety precautions have been read and understood
 P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking
 P271 - Use only outdoors or in a well-ventilated area
 P280 - Wear eye protection, face protection, protective gloves, protective clothing
 P302 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area, Get immediate medical advice/attention
 P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
 P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
 P308+P313 - If exposed or concerned: Get medical advice/attention
 P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
 P381 - Eliminate all ignition sources if safe to do so
 P403 - Store in a well-ventilated place
 P501 - Dispose of contents/container in accordance with local/regional/national/international regulations
 CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)
 CGA-PG05 - Use a back flow preventive device in the piping
 CGA-PG06 - Close valve after each use and when empty
 CGA-PG10 - Use only with equipment rated for cylinder pressure
 CGA-PG14 - Approach suspected leak area with caution

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CGA-PG21 - Open valve slowly
CGA-PG29 - Do not depend on odor to detect presence of gas

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

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| Name | Product identifier | % | GHS-US classification |
|------------------------------|---------------------|--------|--|
| n-Butane | (CAS No) 106-97-8 | 99.977 | Flam. Gas 1, H220 Liquefied gas, H280 |
| Tetrahydrothiophene | (CAS No) 110-01-0 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation), H332 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 |
| 1-PROPANETHIOL | (CAS No) 107-03-9 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Eye Irrit. 2A, H319 |
| 2-METHYLTHIOPHENE | (CAS No) 554-14-3 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Dermal), H312 Acute Tox. 4 (Inhalation:gas), H332 |
| ETHYL METHYL SULFIDE | (CAS No) 624-89-5 | 0.001 | Flam. Liq. 2, H225 |
| 2-PROPANETHIOL | (CAS No) 75-33-2 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Acute Tox. 3 (Inhalation:gas), H331 Eye Irrit. 2A, H319 |
| 2-METHYL-1-PROPANETHIOL | (CAS No) 513-44-0 | 0.001 | Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335 |
| ethanethiol, ethyl mercaptan | (CAS No) 75-08-1 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation), H332 Aquatic Acute 1, H400 Aquatic Chronic 1, H410 |
| Dimethyl sulfide | (CAS No) 75-18-3 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Eye Irrit. 2A, H319 |
| METHYL ETHYL DISULFIDE | (CAS No) 20333-39-5 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335 |
| ETHYL DISULFIDE | (CAS No) 110-81-6 | 0.001 | Flam. Liq. 3, H226 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335 |
| Carbon disulfide | (CAS No) 75-15-0 | 0.001 | Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 Repr. 2, H361 STOT RE 1, H372 |
| BUTYL MERCAPTAN | (CAS No) 109-79-5 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Inhalation), H332 Eye Irrit. 2A, H319 |
| Carbonyl sulfide | (CAS No) 463-58-1 | 0.001 | Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 3 (Inhalation:gas), H331 |
| Diethyl sulfide | (CAS No) 352-93-2 | 0.001 | Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 |
| Methanethiol | (CAS No) 74-93-1 | 0.001 | Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 3 (Inhalation:gas), H331 Aquatic Acute 1, H400 Aquatic Chronic 1, H410 |
| Hydrogen sulfide | (CAS No) 7783-06-4 | 0.001 | Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 2 (Inhalation:gas), H330 STOT SE 3, H335 Aquatic Acute 1, H400 |

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| Name | Product identifier | % | GHS-US classification |
|-------------------------|--------------------|-------|--|
| Dimethyl Disulfide | (CAS No) 624-92-0 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Dermal), H312 Acute Tox. 3 (Inhalation:gas), H331 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335 Aquatic Chronic 2, H411 |
| Thiofuran | (CAS No) 110-02-1 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation:gas), H332 Skin Irrit. 2, H315 Eye Dam. 1, H318 STOT SE 3, H335 |
| 2-Methyl-2-Propanethiol | (CAS No) 75-66-1 | 0.001 | Flam. Liq. 2, H225 Skin Sens. 1, H317 Aquatic Chronic 2, H411 |
| 3-METHYL-THIOPHENE | (CAS No) 616-44-4 | 0.001 | Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Dermal), H312 Acute Tox. 4 (Inhalation:gas), H332 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335 |
| Phenyl sulfide | (CAS No) 139-66-2 | 0.001 | Acute Tox. 4 (Oral), H302 Skin Irrit. 2, H315 Aquatic Acute 1, H400 Aquatic Chronic 1, H410 |
| 3-METHYLBENZOTHIOPHENE | (CAS No) 1455-18-1 | 0.001 | Acute Tox. 4 (Oral), H302 |
| 1-METHYL-1-PROPANETHIOL | (CAS No) 513-53-1 | 0.001 | Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335 |

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.
- First-aid measures after skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.
- First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
- 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

- Symptoms/injuries after inhalation : May displace oxygen and cause rapid suffocation.
- Symptoms/injuries after skin contact : May cause frostbite.
- Symptoms/injuries after eye contact : Contact with the product may cause cold burns or frostbite.
- Symptoms/injuries after ingestion : Ingestion is not considered a potential route of exposure.
- Symptoms/injuries upon intravenous administration : Not known.
- Chronic symptoms : Adverse effects not expected from this product.

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

If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

- Fire hazard : This product is flammable.

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- Explosion hazard : Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. May form flammable/explosive vapor-air mixture.
- Reactivity : None known.

5.3. Advice for firefighters

- Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.
- Protection during firefighting : Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for fire fighters. Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Ensure adequate ventilation.

6.1.1. For non-emergency personnel

- Protective equipment : Wear protective equipment consistent with the site emergency plan.
- Emergency procedures : Escape the danger area by the closest safe route. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

6.1.2. For emergency responders

- Protective equipment : Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for fire fighters. Equip cleanup crew with proper protection.
- Emergency procedures : Evacuate and limit access. Ventilate area. Remove ignition sources. Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering atmospheres of unknown contaminant concentration until proven to be safe.

6.2. Environmental precautions

- Try to stop release if safe to do so.

6.3. Methods and material for containment and cleaning up

- For containment : Try to stop release if safe to do so.
- Methods for cleaning up : Dispose of this material and its container in accordance with local regulations.

6.4. Reference to other sections

- See also Sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Additional hazards when processed : Pressurized container: Do not pierce or burn, even after use. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Handle empty containers with care because residual vapors are flammable. In use, may form flammable vapor-air mixture.
- Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Use only non-sparking tools.
- Hygiene measures : Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Comply with applicable regulations. Proper grounding procedures to avoid static electricity should be followed.
- Storage conditions : Do not expose to temperatures exceeding 52°C (125°F). Keep container closed when not in use. Protect cylinder from physical damage. Store in well ventilated area.
- Incompatible products : None known.
- Incompatible materials : Oxidizing materials. Air.

7.3. Specific end use(s)

- See Section 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

| 23 Components in n-Butane | |
|---------------------------|----------------|
| ACGIH | Not applicable |

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|--|--------------------------|--------|
| OSHA | Not applicable | |
| BUTYL MERCAPTAN (109-79-5) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Carbon disulfide (75-15-0) | | |
| ACGIH | ACGIH TWA (ppm) | 1 ppm |
| OSHA | OSHA PEL (TWA) (ppm) | 20 ppm |
| OSHA | OSHA PEL (Ceiling) (ppm) | 30 ppm |
| Carbonyl sulfide (463-58-1) | | |
| ACGIH | ACGIH TWA (ppm) | 5 ppm |
| OSHA | Not applicable | |
| ETHYL DISULFIDE (110-81-6) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Diethyl sulfide (352-93-2) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| METHYL ETHYL DISULFIDE (20333-39-5) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Dimethyl Disulfide (624-92-0) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Dimethyl sulfide (75-18-3) | | |
| ACGIH | ACGIH TWA (ppm) | 10 ppm |
| OSHA | Not applicable | |
| Phenyl sulfide (139-66-2) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| ethanethiol, ethyl mercaptan (75-08-1) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Hydrogen sulfide (7783-06-4) | | |
| ACGIH | ACGIH TWA (ppm) | 1 ppm |
| ACGIH | ACGIH STEL (ppm) | 5 ppm |
| OSHA | OSHA PEL (Ceiling) (ppm) | 20 ppm |
| 2-METHYL-1-PROPANETHIOL (513-44-0) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| 3-METHYLBENZOTHIOPHENE (1455-18-1) | | |
| ACGIH | Not applicable | |

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| 3-METHYLBENZOTHIOPHENE (1455-18-1) | | |
|---|---|----------------------|
| OSHA | Not applicable | |
| 2-PROPANETHIOL (75-33-2) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| 2-Methyl-2-Propanethiol (75-66-1) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| ETHYL METHYL SULFIDE (624-89-5) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Methanethiol (74-93-1) | | |
| ACGIH | ACGIH TWA (ppm) | 0.5 ppm |
| OSHA | OSHA PEL (Ceiling) (mg/m ³) | 20 mg/m ³ |
| OSHA | OSHA PEL (Ceiling) (ppm) | 10 ppm |
| 2-METHYLTHIOPHENE (554-14-3) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| 3-METHYL-THIOPHENE (616-44-4) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| 1-PROPANETHIOL (107-03-9) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| 1-METHYL-1-PROPANETHIOL (513-53-1) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Tetrahydrothiophene (110-01-0) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| Thiofuran (110-02-1) | | |
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| n-Butane (106-97-8) | | |
| ACGIH | ACGIH STEL (ppm) | 1000 ppm |
| OSHA | Not applicable | |

8.2. Exposure controls

| | |
|----------------------------------|---|
| Appropriate engineering controls | : Ensure exposure is below occupational exposure limits. Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Oxygen detectors should be used when asphyxiating gases may be released. Consider work permit system e.g. for maintenance activities. |
| Hand protection | : Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand Protection. |
| Eye protection | : Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection. |
| Skin and body protection | : Wear suitable protective clothing, e.g. - lab coats, coveralls or flame resistant clothing. |

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| | |
|---------------------------------|---|
| Respiratory protection | : None necessary during normal and routine operations. See Sections 5 & 6. |
| Thermal hazard protection | : None necessary during normal and routine operations. |
| Environmental exposure controls | : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. |
| Other information | : Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection. |

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

| | |
|---|---|
| Physical state | : Gas |
| Appearance | : Clear, colorless gas. |
| Color | : Colorless |
| Odor | : Sulfide-like stench |
| Odor threshold | : No data available |
| pH | : No data available |
| Melting point | : No data available |
| Freezing point | : No data available |
| Boiling point | : No data available |
| Flash point | : No data available |
| Relative evaporation rate (butyl acetate=1) | : No data available |
| Flammability (solid, gas) | : See Section 2.1 and 2.2 |
| Explosion limits | : No data available |
| Explosive properties | : Without adequate ventilation formation of explosive mixtures may be possible. |
| Oxidizing properties | : None. |
| Vapor pressure | : No data available |
| Relative density | : No data available |
| Relative vapor density at 20 °C | : No data available |
| Molecular mass | : No Data Available |
| Relative gas density | : Heavier than air |
| Solubility | : No data available |
| Log Pow | : No data available |
| Log Kow | : No data available |
| Auto-ignition temperature | : No data available |
| Decomposition temperature | : No data available |
| Viscosity | : No data available |
| Viscosity, kinematic | : No data available |
| Viscosity, dynamic | : No data available |

9.2. Other information

| | |
|------------------------|--|
| 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

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form explosive mixture with air.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Oxidizing materials. Air.

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10.6. Hazardous decomposition products

Under normal conditions of storage and use hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

| BUTYL MERCAPTAN (109-79-5) | |
|-----------------------------------|---------------------------|
| ATE US (oral) | 500.000 mg/kg body weight |
| ATE US (gases) | 4500.000 ppmV/4h |
| ATE US (vapors) | 11.000 mg/l/4h |
| ATE US (dust, mist) | 1.500 mg/l/4h |

| Carbon disulfide (75-15-0) | |
|-----------------------------------|--|
| LD50 oral rat | 3188 mg/kg |
| LC50 inhalation rat (mg/l) | 25 g/m ³ (Exposure time: 2 h) |
| LC50 inhalation rat (ppm) | 5676.52 ppm/4h |
| ATE US (oral) | 3188.000 mg/kg body weight |
| ATE US (gases) | 5676.520 ppmV/4h |
| ATE US (vapors) | 25.000 mg/l/4h |
| ATE US (dust, mist) | 25.000 mg/l/4h |

| Carbonyl sulfide (463-58-1) | |
|------------------------------------|-----------------|
| LC50 inhalation rat (ppm) | 850 ppm/4h |
| ATE US (gases) | 850.000 ppmV/4h |

| Diethyl sulfide (352-93-2) | |
|-----------------------------------|----------------------------|
| LD50 oral rat | 3415 mg/kg |
| ATE US (oral) | 3415.000 mg/kg body weight |

| METHYL ETHYL DISULFIDE (20333-39-5) | |
|--|---------------------------|
| ATE US (oral) | 500.000 mg/kg body weight |

| Dimethyl Disulfide (624-92-0) | |
|--------------------------------------|----------------------------|
| LC50 inhalation rat (ppm) | 805 ppm/4h |
| ATE US (oral) | 500.000 mg/kg body weight |
| ATE US (dermal) | 1100.000 mg/kg body weight |
| ATE US (gases) | 805.000 ppmV/4h |

| Dimethyl sulfide (75-18-3) | |
|-----------------------------------|---------------------------|
| LD50 oral rat | 535 mg/kg |
| LD50 dermal rabbit | > 5000 mg/kg |
| LC50 inhalation rat (ppm) | 40250 ppm/4h |
| ATE US (oral) | 100.000 mg/kg body weight |

| Phenyl sulfide (139-66-2) | |
|----------------------------------|---------------------------|
| LD50 oral rat | 490 µl/kg |
| ATE US (oral) | 500.000 mg/kg body weight |

| ethanethiol, ethyl mercaptan (75-08-1) | |
|---|------------------|
| LC50 inhalation rat (ppm) | 4420 ppm/4h |
| ATE US (gases) | 4500.000 ppmV/4h |
| ATE US (vapors) | 11.000 mg/l/4h |
| ATE US (dust, mist) | 1.500 mg/l/4h |

| Hydrogen sulfide (7783-06-4) | |
|-------------------------------------|--------------------------------|
| LC50 inhalation rat (mg/l) | 0.99 mg/l (Exposure time: 1 h) |
| LC50 inhalation rat (ppm) | 356 ppm/4h |

| 3-METHYLBENZOTHIOPHENE (1455-18-1) | |
|---|---------------------------|
| ATE US (oral) | 500.000 mg/kg body weight |

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| 2-PROPANETHIOL (75-33-2) | |
|---------------------------------|---------------------------|
| ATE US (oral) | 500.000 mg/kg body weight |
| ATE US (gases) | 700.000 ppmV/4h |

| Methanethiol (74-93-1) | |
|-------------------------------|---------------------------|
| LD50 oral rat | 109.6 mg/kg |
| LD50 dermal rat | > 84.8 mg/kg |
| LC50 inhalation rat (ppm) | 675 ppm/4h |
| ATE US (oral) | 109.600 mg/kg body weight |
| ATE US (gases) | 675.000 ppmV/4h |

| 2-METHYLTHIOPHENE (554-14-3) | |
|-------------------------------------|----------------------------|
| ATE US (dermal) | 1100.000 mg/kg body weight |
| ATE US (gases) | 4500.000 ppmV/4h |

| 3-METHYL-THIOPHENE (616-44-4) | |
|--------------------------------------|----------------------------|
| ATE US (oral) | 500.000 mg/kg body weight |
| ATE US (dermal) | 1100.000 mg/kg body weight |
| ATE US (gases) | 4500.000 ppmV/4h |

| 1-PROPANETHIOL (107-03-9) | |
|----------------------------------|---------------------------|
| ATE US (oral) | 500.000 mg/kg body weight |

| Tetrahydrothiophene (110-01-0) | |
|---------------------------------------|------------------|
| ATE US (gases) | 4500.000 ppmV/4h |
| ATE US (vapors) | 11.000 mg/l/4h |
| ATE US (dust, mist) | 1.500 mg/l/4h |

| Thiofuran (110-02-1) | |
|-----------------------------|------------------|
| LC50 inhalation rat (ppm) | 9748 ppm/4h |
| ATE US (gases) | 4500.000 ppmV/4h |

| n-Butane (106-97-8) | |
|----------------------------|---|
| LC50 inhalation rat (mg/l) | 658 g/m ³ (Exposure time: 4 h) |
| LC50 inhalation rat (ppm) | 276789.28 ppm/4h |

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Not classified
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified

Reproductive toxicity : Not classified
Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

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| | |
|---|---|
| Symptoms/injuries after inhalation | : May displace oxygen and cause rapid suffocation. |
| Symptoms/injuries after skin contact | : May cause frostbite. |
| Symptoms/injuries after eye contact | : Contact with the product may cause cold burns or frostbite. |
| Symptoms/injuries after ingestion | : Ingestion is not considered a potential route of exposure. |
| Symptoms/injuries upon intravenous administration | : Not known. |
| Chronic symptoms | : Adverse effects not expected from this product. |

SECTION 12: Ecological information

12.1. Toxicity

| Carbon disulfide (75-15-0) | |
|----------------------------|---|
| LC50 fish 1 | 3 - 5.8 mg/l (Exposure time: 96 h - Species: Poecilia reticulata [semi-static]) |
| EC50 Daphnia 1 | 2.1 mg/l (Exposure time: 48 h - Species: Daphnia magna) |
| LC50 fish 2 | 4 mg/l (Exposure time: 96 h - Species: Poecilia reticulata [static]) |

| Dimethyl sulfide (75-18-3) | |
|----------------------------|--|
| EC50 Daphnia 1 | 23 mg/l (Exposure time: 48 h - Species: Daphnia pulex) |

| Hydrogen sulfide (7783-06-4) | |
|------------------------------|---|
| LC50 fish 1 | 0.0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through]) |
| EC50 Daphnia 1 | 0.022 mg/l (Exposure time: 96 h - Species: Gammarus pseudolimnaeus) |
| LC50 fish 2 | 0.016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through]) |

12.2. Persistence and degradability

| Carbonyl sulfide (463-58-1) | |
|-------------------------------|-------------------------------------|
| Persistence and degradability | Not applicable for inorganic gases. |

| Hydrogen sulfide (7783-06-4) | |
|-------------------------------|-------------------------------------|
| Persistence and degradability | Not applicable for inorganic gases. |

| Methanethiol (74-93-1) | |
|-------------------------------|--|
| Persistence and degradability | The substance is biodegradable. Unlikely to persist. |

| n-Butane (106-97-8) | |
|-------------------------------|--------------------|
| Persistence and degradability | No data available. |

12.3. Bioaccumulative potential

| Carbon disulfide (75-15-0) | |
|----------------------------|---------|
| BCF fish 1 | 4.3 - 8 |

| Carbonyl sulfide (463-58-1) | |
|-----------------------------|-------------------------------------|
| Log Pow | Not applicable for inorganic gases. |
| Bioaccumulative potential | No data available. |

| Diethyl sulfide (352-93-2) | |
|----------------------------|------|
| Log Pow | 1.95 |

| Hydrogen sulfide (7783-06-4) | |
|------------------------------|-------------------------------------|
| BCF fish 1 | (no bioaccumulation expected) |
| Log Pow | Not applicable for inorganic gases. |
| Bioaccumulative potential | No data available. |

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| Methanethiol (74-93-1) | |
|-------------------------------|--------------------|
| Log Pow | Not known. |
| Bioaccumulative potential | No data available. |

| n-Butane (106-97-8) | |
|----------------------------|---|
| Log Pow | 2.89 |
| Log Kow | Not applicable for gas-mixtures. |
| Bioaccumulative potential | Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9. |

12.4. Mobility in soil

| Carbonyl sulfide (463-58-1) | |
|------------------------------------|---|
| Ecology - soil | Because of its high volatility, the product is unlikely to cause ground or water pollution. |

| Hydrogen sulfide (7783-06-4) | |
|-------------------------------------|---|
| Ecology - soil | Because of its high volatility, the product is unlikely to cause ground or water pollution. |

| Methanethiol (74-93-1) | |
|-------------------------------|---|
| Ecology - soil | Because of its high volatility, the product is unlikely to cause ground or water pollution. |

| n-Butane (106-97-8) | |
|----------------------------|---|
| 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

- Effect on ozone layer : No known effects from this product.
- Effect on the global warming : No known ecological damage caused by this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Waste treatment methods : Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded. Waste gas should be flared through a suitable burner with flash back arrestor. Do not discharge into areas where there is a risk of forming an explosive mixture with air.
- Waste disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

SECTION 14: Transport information

Department of Transportation (DOT)

- In accordance with DOT
- Transport document description : UN3161 Liquefied gas, flammable, n.o.s., 2.1
- UN-No.(DOT) : UN3161
- Proper Shipping Name (DOT) : Liquefied gas, flammable, n.o.s.
- Transport hazard class(es) (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115
- Hazard labels (DOT) : 2.1 - Flammable gas



- DOT Packaging Non Bulk (49 CFR 173.xxx) : 304
- DOT Packaging Bulk (49 CFR 173.xxx) : 314;315
- DOT Symbols : G - Identifies PSN requiring a technical name

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| | |
|--|---|
| 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. |
| DOT Packaging Exceptions (49 CFR 173.xxx) | : 306 |
| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | : Forbidden |
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) | : 150 kg |
| DOT Vessel Stowage Location | : D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded. |
| DOT Vessel Stowage Other | : 40 - Stow "clear of living quarters" |

Additional information

Other information : No supplementary information available.

ADR

| | |
|---|--|
| Transport document description | : UN 3161 LIQUEFIED GAS, FLAMMABLE, N.O.S., 2.1, (B/D) |
| Class (ADR) | : 2 - Gases |
| Hazard identification number (Kemler No.) | : 23 |
| Classification code (ADR) | : 2F |
| Hazard labels (ADR) | : 2.1 - Flammable gases |



Orange plates :



| | |
|-------------------------------|-------|
| Tunnel restriction code (ADR) | : B/D |
| Limited quantities (ADR) | : 0 |
| Excepted quantities (ADR) | : E0 |

Transport by sea

| | |
|-----------------------------|-----------------------------------|
| UN-No. (IMDG) | : 3161 |
| Proper Shipping Name (IMDG) | : Liquefied Gas, Flammable, N.O.S |
| Class (IMDG) | : 2 - Gases |

Air transport

| | |
|-----------------------------|-----------------------------------|
| UN-No. (IATA) | : 3161 |
| Proper Shipping Name (IATA) | : Liquefied Gas, Flammable, N.O.S |
| Class (IATA) | : 2.1 - Gases : Flammable |

SECTION 15: Regulatory information

15.1. US Federal regulations

| | |
|---|--|
| Carbon disulfide (75-15-0) | |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory | |
| Listed on the United States SARA Section 302 | |
| Subject to reporting requirements of United States SARA Section 313 | |
| EPA TSCA Regulatory Flag | T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA. |
| SARA Section 302 Threshold Planning Quantity (TPQ) | 10000 |
| SARA Section 313 - Emission Reporting | 1.0 % |

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| Carbonyl sulfide (463-58-1) | |
|--|-------|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory Subject to reporting requirements of United States SARA Section 313 | |
| SARA Section 313 - Emission Reporting | 1.0 % |

| Diethyl sulfide (352-93-2) | |
|---|--|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory | |

| Dimethyl sulfide (75-18-3) | |
|---|--|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory | |

| Phenyl sulfide (139-66-2) | |
|---|--|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory | |

| Hydrogen sulfide (7783-06-4) | |
|--|-------|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on the United States SARA Section 302 Subject to reporting requirements of United States SARA Section 313 | |
| SARA Section 302 Threshold Planning Quantity (TPQ) | 500 |
| SARA Section 313 - Emission Reporting | 1.0 % |

| Methanethiol (74-93-1) | |
|---|-----|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on the United States SARA Section 302 | |
| SARA Section 302 Threshold Planning Quantity (TPQ) | 500 |

| n-Butane (106-97-8) | |
|---|--|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory | |

15.2. International regulations

CANADA

No additional information available

| Carbon disulfide (75-15-0) | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class B Division 2 - Flammable Liquid Class D Division 1 Subdivision B - Toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects |

| Carbonyl sulfide (463-58-1) | |
|---|--|
| Listed on the Canadian DSL (Domestic Substances List) | |

| Diethyl sulfide (352-93-2) | |
|---|--|
| Listed on the Canadian DSL (Domestic Substances List) | |

| Dimethyl sulfide (75-18-3) | |
|---|--|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class B Division 2 - Flammable Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects |

| Phenyl sulfide (139-66-2) | |
|---|--|
| Listed on the Canadian DSL (Domestic Substances List) | |

| Hydrogen sulfide (7783-06-4) | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects |

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| Methanethiol (74-93-1) | |
|---|--|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects |

| n-Butane (106-97-8) | |
|---|--|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class A - Compressed Gas Class B Division 1 - Flammable Gas |

EU-Regulations

No additional information available

| Carbon disulfide (75-15-0) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| Carbonyl sulfide (463-58-1) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| Diethyl sulfide (352-93-2) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| Dimethyl sulfide (75-18-3) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| Phenyl sulfide (139-66-2) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| Hydrogen sulfide (7783-06-4) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| Methanethiol (74-93-1) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

| n-Butane (106-97-8) |
|--|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Not classified

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

No additional information available

National regulations

| Carbon disulfide (75-15-0) |
|--|
| Listed on the AICS (Australian Inventory of Chemical Substances) 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 Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Japanese Poisonous and Deleterious Substances Control Law Japanese Pollutant Release and Transfer Register Law (PRTR Law) Listed on the Canadian IDL (Ingredient Disclosure List) |

| Carbonyl sulfide (463-58-1) |
|---|
| Listed on the AICS (Australian Inventory of Chemical Substances) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List) |

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Diethyl sulfide (352-93-2)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

Dimethyl sulfide (75-18-3)

Listed on the AICS (Australian Inventory of Chemical Substances)
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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

Phenyl sulfide (139-66-2)

Listed on the AICS (Australian Inventory of Chemical Substances)
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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

Hydrogen sulfide (7783-06-4)

Listed on the AICS (Australian Inventory of Chemical Substances)
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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

Methanethiol (74-93-1)

Listed on the AICS (Australian Inventory of Chemical Substances)
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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Japanese Poisonous and Deleterious Substances Control Law
Listed on the Canadian IDL (Ingredient Disclosure List)

n-Butane (106-97-8)

Listed on the AICS (Australian Inventory of Chemical Substances)
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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

Carbon disulfide (75-15-0)

| U.S. - California - Proposition 65 - Carcinogens List | U.S. - California - Proposition 65 - Developmental Toxicity | U.S. - California - Proposition 65 - Reproductive Toxicity - Female | U.S. - California - Proposition 65 - Reproductive Toxicity - Male | No significant risk level (NSRL) |
|---|---|---|---|----------------------------------|
| No | Yes | Yes | Yes | |

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Carbon disulfide (75-15-0)

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) List

Carbonyl sulfide (463-58-1)

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) List

Diethyl sulfide (352-93-2)

U.S. - New Jersey - Right to Know Hazardous Substance List

Dimethyl sulfide (75-18-3)

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) List

Hydrogen sulfide (7783-06-4)

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) List

Methanethiol (74-93-1)

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) List

n-Butane (106-97-8)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

- | | |
|-----------------------|---|
| Indication of changes | : Revised safety data sheet in accordance with OSHA final rule on GHS implementation promulgated March 26, 2012. |
| Other information | : This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. |

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Full text of H-phrases:

| | |
|-------------------------------|--|
| Acute Tox. 2 (Inhalation:gas) | Acute toxicity (inhalation:gas) Category 2 |
| Acute Tox. 3 (Inhalation:gas) | Acute toxicity (inhalation:gas) Category 3 |
| Acute Tox. 3 (Oral) | Acute toxicity (oral) Category 3 |
| Acute Tox. 4 (Dermal) | Acute toxicity (dermal) Category 4 |
| Acute Tox. 4 (Inhalation) | Acute toxicity (inhalation) Category 4 |
| Acute Tox. 4 (Inhalation:gas) | Acute toxicity (inhalation:gas) Category 4 |
| Acute Tox. 4 (Oral) | Acute toxicity (oral) Category 4 |
| Aquatic Acute 1 | Hazardous to the aquatic environment - Acute Hazard Category 1 |
| Aquatic Chronic 1 | Hazardous to the aquatic environment - Chronic Hazard Category 1 |
| Aquatic Chronic 2 | Hazardous to the aquatic environment - Chronic Hazard Category 2 |
| Eye Dam. 1 | Serious eye damage/eye irritation Category 1 |
| Eye Irrit. 2A | Serious eye damage/eye irritation Category 2A |
| Flam. Gas 1 | Flammable gases Category 1 |
| Flam. Liq. 2 | Flammable liquids Category 2 |
| Flam. Liq. 3 | Flammable liquids Category 3 |
| Liquefied gas | Gases under pressure Liquefied gas |
| Repr. 2 | Reproductive toxicity Category 2 |
| Skin Irrit. 2 | Skin corrosion/irritation Category 2 |
| Skin Sens. 1 | Skin sensitization Category 1 |
| STOT RE 1 | Specific target organ toxicity (repeated exposure) Category 1 |
| STOT SE 3 | Specific target organ toxicity (single exposure) Category 3 |
| H220 | Extremely flammable gas |
| H225 | Highly flammable liquid and vapor |
| H226 | Flammable liquid and vapor |
| H280 | Contains gas under pressure; may explode if heated |
| H301 | Toxic if swallowed |
| H302 | Harmful if swallowed |
| H312 | Harmful in contact with skin |
| H315 | Causes skin irritation |
| H317 | May cause an allergic skin reaction |
| H318 | Causes serious eye damage |
| H319 | Causes serious eye irritation |
| H330 | Fatal if inhaled |
| H331 | Toxic if inhaled |
| H332 | Harmful if inhaled |
| H335 | May cause respiratory irritation |
| H361 | Suspected of damaging fertility or the unborn child |
| H372 | Causes damage to organs through prolonged or repeated exposure |
| H400 | Very toxic to aquatic life |
| H410 | Very toxic to aquatic life with long lasting effects |
| H411 | Toxic to aquatic life with long lasting effects |

SDS US (GHS HazCom 2012)

This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide America Corporation's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.