Section 1. IDENTIFICATION

1.1. Product identifier

Product form : Mixture

Product name : Hydrogen Sulfide (0.0001%-0.01%); Carbon Monoxide (0.0001%-0.0999%); Methane (0.0001%-3.0%) in Air (Oxygen 20.9% bal. Nitrogen)

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

Product use : Calibration gas/Bumptest gas/Function test gas

Section 2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification : GASES UNDER PRESSURE - Compressed gas

2.2. Label elements

Hazard pictograms

Signal word : WARNING

Hazard statements : H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
                  : CGA-HG24 - MAY SUPPORT COMBUSTION
                  : OSHA - PG01 - DO NOT REMOVE THIS PRODUCT LABEL

Precautionary statements

EN (English US)  SDS ID# 5055
[General]  Read and follow all Safety Data Sheets (SDS's) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have a product container or label at hand. Use equipment rated for cylinder pressure.

[Prevention]  P202 - Do not handle until all safety precautions have been read and understood
  : P271+P403 - Use only outdoors or in a well-ventilated area

[Response] : P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing.

[Storage]  CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

[Disposal] : Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3. Other hazards
No additional information available

2.4. Unknown acute toxicity
No data available

Section 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance
Not applicable

3.2. Mixture

<table>
<thead>
<tr>
<th>Name</th>
<th>Product Identifier</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>(CAS No) 7727-37-9</td>
<td>80.4997 - 73.3901</td>
</tr>
<tr>
<td>Oxygen</td>
<td>(CAS No) 7782-44-7</td>
<td>19.5 - 23.5</td>
</tr>
<tr>
<td>Methane</td>
<td>(CAS No) 74-82-8</td>
<td>0.0001 - 3.0</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>(CAS No) 630-08-0</td>
<td>0.0001 - 0.0999</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>(CAS No) 7783-06-4</td>
<td>0.0001 - 0.01</td>
</tr>
</tbody>
</table>

Section 4. FIRST AID MEASURES

4.1. Description of first aid measures

General : IF exposed or concerned: Get medical advice/attention.

Inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If breathing has stopped, give artificial respiration or oxygen by trained personnel. If victim feels unwell, seek medical advice.

Skin contact : Immediately flush with copious amount of water for at least 15 minutes.

Eye contact  : Immediately flush with copious amount of water for at least 15 minutes.

Ingestion  : Ingestion is not considered a potential route of exposure, refer to the inhalation section.

4.2. Most important symptoms/effects, acute and delayed

Acute
Hydrogen Sulfide (0.0001%-0.01%); Carbon Monoxide (0.0001%-0.0999%); Methane (0.0001%-3.0%) in Air (Oxygen 20.9% bal. Nitrogen)

Inhalation: Adverse effects not expected from this product.
Skin contact: Contact with rapidly expanding gas may cause burns or frostbite.
Eye contact: Contact with rapidly expanding gas may cause burns or frostbite.
Ingestion: Ingestion is not considered a potential route of exposure, refer to the inhalation section.
Frostbite: Thaw frosted parts with lukewarm water. Do not rub affected areas. Get immediate medical advice/attention.

Symptoms/injuries upon intravenous administration: Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing.

Chronic symptoms: Adverse effects not expected from this product.
Delayed: Adverse effects not expected from this product.

Section 5. FIREFIGHTING MEASURES

5.1. Extinguishing media
Suitable extinguishing media: Use extinguishing media appropriate for surrounding fire.
Unsuitable extinguishing media: None known.

5.2. Special hazards arising from the substance or mixture
Fire hazard: The product is not flammable.
Explosion hazard: Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.
Reactivity: None known.

5.3. Advice for fire-fighters
Firefighting instructions: In case of fire: Evacuate all personnel from the danger area. Stop the leak and flow of gas before extinguishing fire, if safe to do so. If this is not possible, withdraw from area and allow fire to burn. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Let the fire burn. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Exercise caution when fighting any chemical fire.
Protection during firefighting: Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus, SCBA) 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

EN (English US) SDS ID# 5055
Hydrogen Sulfide (0.0001%-0.01%); Carbon Monoxide (0.0001%-0.0999%); Methane (0.0001%-3.0%) in Air (Oxygen 20.9% bal. Nitrogen)

6.1.12. 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. See information above "For non-emergency personnel".

6.2. Methods and material for containment and cleaning up
For containment: Immediately contact emergency personnel. Try to stop gas leak if safe to do so.
Methods for cleaning up: Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 7. HANDLING AND STORAGE
7.1. Precautions for safe handling
Precautions for safety handling: Pressurized container: Do not pierce or burn, even after use. Use equipment rated for cylinder pressure. Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Protect cylinders from physical damage; do not drag, roll, slide, or drop.
Hygiene measures: Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities
Technical measures: None known.
Storage conditions: Do not expose to temperatures exceeding 52°C (125°F). Keep containers closed when not in use. Protect cylinder from physical damage. Store in well ventilated area.
Incompatible products: None known.
Incompatible materials: None known.

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Nitrogen (7727-37-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OSHA PEL</strong></td>
</tr>
<tr>
<td>ppm</td>
</tr>
<tr>
<td>Not established</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oxygen (7782-44-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OSHA PEL</strong></td>
</tr>
<tr>
<td>ppm</td>
</tr>
</tbody>
</table>
## Methane (74-82-8)

<table>
<thead>
<tr>
<th>OSHA PEL</th>
<th>Cal/OSHA PEL</th>
<th>NIOSH REL</th>
<th>ACGIH 2015 TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>ppm</td>
<td>mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-hour TWA</td>
<td>(ST) STEL</td>
<td>up to 10-hour TWA</td>
<td>8-hour TWA</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(ST) STEL</td>
</tr>
<tr>
<td>up to 10-hour TWA</td>
<td>(ST) STEL</td>
<td>8-hour TWA</td>
<td>(ST) STEL</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>1,000 ppm</td>
<td>(C) Ceiling</td>
</tr>
</tbody>
</table>

## Carbon Monoxide (630-08-0)

<table>
<thead>
<tr>
<th>OSHA PEL</th>
<th>Cal/OSHA PEL</th>
<th>NIOSH REL</th>
<th>ACGIH 2015 TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>ppm</td>
<td>mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-hour TWA</td>
<td>(ST) STEL</td>
<td>up to 10-hour TWA</td>
<td>8-hour TWA</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(ST) STEL</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(ST) STEL</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>1,000 ppm</td>
<td>(C) Ceiling</td>
</tr>
</tbody>
</table>

## Hydrogen Sulfide (7783-06-4)

<table>
<thead>
<tr>
<th>OSHA PELs</th>
<th>Cal/OSHA PEL</th>
<th>NIOSH REL</th>
<th>ACGIH 2015 TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-hour Time Weighted Average (TWA)</td>
<td>Acceptable Ceiling Concentration</td>
<td>Acceptable maximum peak</td>
<td>up to 10-hour TWA</td>
</tr>
<tr>
<td>ppm</td>
<td>mg/m³</td>
<td>(as of 4/26/13)</td>
<td>(as of 4/26/13)</td>
</tr>
<tr>
<td>8-hour TWA</td>
<td>(ST) STEL</td>
<td>8-hour TWA</td>
<td>(ST) STEL</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>8-hour TWA</td>
<td>(ST) STEL</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>10 ppm</td>
<td>(ST) 15 ppm</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(C) 10 ppm [10 min]</td>
<td>(ST) 5 ppm</td>
</tr>
<tr>
<td>(C) Ceiling</td>
<td>(C) Ceiling</td>
<td>(C) 20 ppm</td>
<td>IDLH - 100 ppm</td>
</tr>
</tbody>
</table>

### 8.2. Appropriate engineering controls

**Engineering measures/controls**

- Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly check for leakages. Ensure exposure is below occupational exposure limits. Oxygen detectors should be used when asphyxiating gases may me released. Consider work permit system e.g. for maintenance activities.
### 8.3. Individual protection measures

- **Skin and body protection**: Wear suitable protective clothing, e.g.-Lab coats, coveralls or flame resistant clothing.
- **Respiratory protection**: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.
- **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. Exposure controls

- **Appearance**: Clear, colorless gas.
- **Physical state**: Gas
- **Color**: Colorless
- **Odor**: Rotten eggs: Sulfide-like
- **Odor threshold**: 0.13 ppm (Hydrogen sulfide)
- **pH**: No data available
- **Freezing point**: No data available
- **Flash point**: No data available
- **Evaporation rate**: No data available
- **Flammability (solid, gas)**: Not Flammable - not combustible
- **Upper flammability**: Not Flammable - not combustible
- **Lower flammability**: Not Flammable - not combustible
- **Relative density**: No data available
- **Solubility**: No data available
- **Partition coefficient**: No data available
- **Auto-ignition temperature**: No data available
- **Decomposition temperature**: No data available
- **Viscosity**: Not applicable

<table>
<thead>
<tr>
<th></th>
<th>Carbon Monoxide</th>
<th>Oxygen</th>
<th>Nitrogen</th>
<th>Methane</th>
<th>Hydrogen Sulfide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight (grams)</td>
<td>58.12</td>
<td>32.00</td>
<td>28.013</td>
<td>16.04</td>
<td>34.08</td>
</tr>
<tr>
<td>Boiling point</td>
<td>-0.5 °C</td>
<td>-182.9 °C</td>
<td>-196 °C</td>
<td>-161.49 °C</td>
<td>-60.3 °C</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>2200 hPa @ 20 °C</td>
<td>Above critical temperature</td>
<td>Above critical temperature</td>
<td>Above critical temperature</td>
<td>18100 hPa@20 °C</td>
</tr>
<tr>
<td>Vapor density at 20°C</td>
<td>2.11</td>
<td>1.11</td>
<td>0.97</td>
<td>0.56</td>
<td>1.19</td>
</tr>
<tr>
<td>Relative gas density</td>
<td>2.52 @ 15 °C</td>
<td>1.331</td>
<td>1.153</td>
<td>0.6784</td>
<td>1.427</td>
</tr>
<tr>
<td>Critical Temperature</td>
<td>152.03 °C</td>
<td>-118.6 °C</td>
<td>-146.9 °C</td>
<td>-82.10 °C</td>
<td>100.5 °C</td>
</tr>
</tbody>
</table>
Section 10. STABILITY AND REACTIVITY

10.1. Reactivity
No reactivity hazard other than the effects described below.

10.2. Chemical stability
Stable under normal conditions.

10.3. Possibility of hazardous reactions
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

10.4. Conditions to avoid
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

10.5. Incompatible materials
None known

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

Section 11. TOXICOLOGICAL INFORMATION

Acute toxicity

<table>
<thead>
<tr>
<th>Substance</th>
<th>LC50 Inhalation Rat (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (7727-37-9)</td>
<td>410,000 ppm/4h</td>
</tr>
<tr>
<td>Oxygen (7782-44-7)</td>
<td>400,000 ppm/4h</td>
</tr>
<tr>
<td>Hydrogen Sulfide (7783-06-4)</td>
<td>712 ppm/1h</td>
</tr>
<tr>
<td>Hydrogen Sulfide (7783-06-4)</td>
<td>444 ppm/4h</td>
</tr>
<tr>
<td>Carbon Monoxide (630-08-0)</td>
<td>3,760 ppm/1h</td>
</tr>
<tr>
<td>Carbon Monoxide (630-08-0)</td>
<td>1,807 ppm/4h</td>
</tr>
</tbody>
</table>

11.1. Information on routes of exposure

Inhalation: Adverse effects not expected from this product
Skin contact: Adverse effects not expected from this product
Eye contact: May cause irritation. Ocular toxicity has been reported at hydrogen sulfide concentrations ranging from 5-30 ppm.
Ingestion: Ingestion is not considered a potential route of exposure

11.2. Symptoms related to physical, chemical and toxicological characteristics

Symptoms: Hydrogen sulfide gas between 15-500 ppm can cause headache, nausea and dizziness. continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness.

11.3. Delayed and immediate effects
### 11.4. Carcinogenic effects

The components of this material are not found on the following lists: FEDERAL OSHA Z LIST, NTP AND IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

### Section 12. ECOLOGICAL INFORMATION

#### 12.1. Aquatic Toxicity

**Ecology - general**

No ecological damage caused by this product

**Hydrogen Sulfide (7783-06-4)**

<table>
<thead>
<tr>
<th>Taxa</th>
<th>LC50 (mg/L) flow-through</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>0.448</td>
<td>96 hours Lepomis macrochirus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pimephales promelas</td>
</tr>
<tr>
<td>Crustacean</td>
<td>0.022</td>
<td>96 hours Gammarus pseudolimnaeus</td>
</tr>
</tbody>
</table>

#### 12.2. Persistence and degradability

No information available for the product

#### 12.3. Bioaccumulative potential

**Hydrogen Sulfide (7783-06-4)**

Partition coefficient: 0.45
Section 14. TRANSPORATION INFORMATION

<table>
<thead>
<tr>
<th>UN #</th>
<th>US DOT</th>
<th>TDG</th>
<th>IMDG</th>
<th>IATA</th>
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</thead>
<tbody>
<tr>
<td>UN 1956</td>
<td>UN 1956</td>
<td>UN 1956</td>
<td>UN 1956</td>
<td></td>
</tr>
</tbody>
</table>

**Proper shipping name**
- Compressed gas, n.o.s. (Nitrogen, Oxygen)

**Transport hazard class(es)**
- 2.2

**Packing group**
- -

**Environment**
- No.
- No.
- No.
- No.

Section 15. REGULATORY INFORMATION

**SARA 311/312 hazard categories**
- Acute Health: No
- Chronic Health: Yes
- Fire: No
- Pressure: Yes
- Reactive: No

SARA Title III Notifications and Information: None known

This product does not contain toxic chemicals subject to reporting requirements of section 313 of the Emergency planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

SARA 311/312: Sudden Release of Pressure Hazard

**15.2. US State regulations**

Nitrogen (007727-37-9)

U.S. - Massachusetts - Right To Know List
Section 16.  OTHER INFORMATION

Date of issue/Date of revision: New SDS 3/1/2015
Revision Note: Initial release

Hazardous Material Information System (USA)
Hazard Scale: 0 = Minimal/ 1 = Slight/ 2 = Moderate/ 3 = Serious/ 4 = Severe

Health: 1
Fire: 0
Physical hazards: 3

Key/Legend
SARA: Superfund Amendments and Reauthorization Act
OSHA: Occupational Safety and Health Administration
DOT: Department of Transportation
TSCA: Toxic Substance Control Act
NTP: National Toxicology Program
ACGIH: American Conference of Governmental Industrial Hygienists
PEL: Permissible Exposure Limit
STEL: Short Term Exposure Limit
TLV: Threshold Limit Value
TDG: Transportation of Dangerous Goods
CAS: Chemical Abstracts Service
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
IATA: International Air Transport Association

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Hydrogen Sulfide (0.0001%-0.01%); Carbon Monoxide (0.0001%-0.0999%); Methane (0.0001%-3.0%) in Air (Oxygen 20.9% bal. Nitrogen)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMDG</td>
<td>International Maritime Dangerous Goods</td>
</tr>
<tr>
<td>TWA</td>
<td>Time Weighted Average</td>
</tr>
<tr>
<td>Prop</td>
<td>Proposition</td>
</tr>
<tr>
<td>ATE</td>
<td>Acute Toxicity Estimate</td>
</tr>
</tbody>
</table>

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