CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE

Containing One or More of the Following Components in a Nitrogen Balance Gas:
Oxygen, 0-23.5%; Methane, 0-2.5%; Hydrogen Sulfide, 0.0005-0.025%

SYNONYMS: Not Applicable
CHEMICAL FAMILY NAME: Not Applicable
FORMULA: Not Applicable

Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE: Calibration of Monitoring and Research Equipment
SUPPLIER/MANUFACTURER’S NAME: CALGAZ, LLC
ADDRESS: 821 Chesapeake Drive
Cambridge, MD 21613
EMERGENCY PHONE: CHEMTREC: 1-800-424-9300
BUSINESS PHONE: 1-410-228-6400
Fax on Demand: 1-800/231-1366

GENERAL MSDS INFORMATION:
Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards
Note: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas mixture has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

2. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>mole %</th>
<th>ACGIH-TLV</th>
<th>OSHA-PEL</th>
<th>NIOSH REL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA ppm</td>
<td>STEL ppm</td>
<td>TWA ppm</td>
<td>STEL ppm</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>7783-08-4</td>
<td>0.0005 - 0.025%</td>
<td>10 (Vocational 1989 PEL)</td>
<td>15 (Vacated 1989 PEL)</td>
<td>20 (ceiling); 50 (ceiling), 10 min. peak once per 8-hour shift, 15 (vacated 1989 PEL)</td>
<td>100 NIOSH REL: STEL = 10 (ceiling) 10 minutes PEL; TWA = 10 PEAK = 2 MAK; 10 min., momentary value; 15 ppm</td>
</tr>
</tbody>
</table>
| Methane | 74-82-8 | 0-2.5% | There are no specific exposure limits for Methane. Methane is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.
| Oxygen | 7782-44-7 | 0-23.5% | There are no specific exposure limits for Oxygen. Oxygen levels should be maintained above 19.5%.
| Nitrogen | 7727-37-9 | Balance | There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This gas mixture is a colorless gas with a disagreeable odor similar to rotten-eggs. Hydrogen Sulfide, a component of this gas mixture, is toxic to humans in relatively low concentrations. The odor cannot be relied on as an adequate warning of the presence of Hydrogen Sulfide, because olfactory fatigue occurs. Additionally, releases of this gas mixture may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas mixture is by inhalation. Inhalation: Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. A significant health hazard associated with this gas mixture is the potential of inhalation of Hydrogen Sulfide, a component of this gas mixture. Such over-exposures may occur if this gas mixture is used in a confined space or other poorly ventilated area. Over-exposures to Hydrogen Sulfide can cause dizziness, headache, and nausea. Exposure to this component can result in respiratory arrest, coma, or unconsciousness. Continuous inhalation of low concentrations of Hydrogen Sulfide may cause olfactory fatigue, so that the odor is no longer an effective warning of the presence of this gas. A summary of exposure concentrations and observed effects are as follows:

CONCENTRATION OF HYDROGEN SULFIDE | OBSERVED EFFECT
--- | ---
0-3 ppm | Odor is unpleasant
5 ppm | Eye irritation. Dryness and irritation of nose, throat.
50 ppm | Irritation of the respiratory system.
100-150 ppm | Temporary loss of smell.
200-250 ppm | Headache, vomiting nausea. Prolonged exposure may lead to lung damage. Exposures of 4-8 hours can be fatal.
300-500 ppm | Swifter onset of symptoms. Death occurs in 1-4 hours.
500 ppm | Headache, excitement, staggering, and stomach ache after brief exposure. Death occurs within 0.5 - 1 hour of exposure.
> 600 ppm | Rapid onset of unconsciousness, coma, death.
> 1000 ppm | Immediate respiratory arrest.

NOTE: This gas mixture contains a maximum of 250 ppm Hydrogen Sulfide. The higher concentration values here are presented to delineate the complete health effects which have been observed for humans after exposure to Hydrogen Sulfide. Additionally, if mixtures of this gas mixture contain less than 19.5% Oxygen and are released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:
TARGET ORGANS: Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system. Refer to Section 11 memory loss, paralysis of facial muscles, or nerve tissue damage. In serious cases of over-exposure, the eyes can be permanently damaged.

CHRONIC: area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to Hydrogen Sulfide over-exposure and oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify the cylinders containing this gas mixture. If there is a planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in other cases, the cylinder may not be leaking. However, if the cylinder is leaking, the release should be immediately contained using a perimeter to prevent further dissemination of the gas. To do this, use a predetermined method, such as a hose stream or water spray. The water should be directed at the cylinder to cool it and prevent further release of the gas.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Hydrogen Sulfide and present an extreme health hazard to firefighters. This gas mixture contains a toxic gas, Hydrogen Sulfide and presents an extreme health hazard to firefighters. This gas mixture contains a toxic gas, Hydrogen Sulfide, which is also highly toxic and deadly. The Hydrogen Sulfide component of this gas mixture may be irritating to the skin. Inhalation and irritation of the eyes can occur at very low airborne concentration of Hydrogen Sulfide (less than 10 ppm). Exposure over several hours may result in "gas eyes" or "tired eyes" with symptoms of dryness, irritation, tearing, and burning. Above 50 ppm Hydrogen Sulfide, there is an intense tearing, blurring of vision, and pain when looking at light. Over-exposed individuals may see rings or black spots around lights. Most symptoms disappear when exposure ceases. However, in serious cases, the eye can be permanently damaged.

**Hazardous Material Identification System**

**Health Hazard**

**Flammability Hazard**

**Physical Hazard**

**Protective Equipment**

**FIRST-AID MEASURES**

**RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT.** At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

No unusual health effects are anticipated after exposure to this gas mixture, due to the small cylinder size. If any adverse symptom develops after over-exposure to this gas mixture, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary.

**SKIN EXPOSURE:** Skin irritation or blistering may occur upon contact with this gas mixture. If skin irritation occurs, flush with water for 15 minutes. If chemical irritants are suspected, remove victim(s) from area immediately. Provide medical attention.

**EYES EXPOSURE:** If irritation of the eye develops after exposure to this gas mixture, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention.

**EYE EXPOSURE:** If irritation of the eye develops after exposure to this gas mixture, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Pre-existing respiratory conditions may be aggravated by over-exposure to this gas mixture. Carbon Monoxide, a component of this gas mixture, can aggravate some diseases of the cardiovascular system, such as coronary artery disease and angina pectoris. Because of the presence of Hydrogen Sulfide, eye disorders or skin problems may be aggravated by over-exposure to this gas mixture.

**RECOMMENDATIONS TO PHYSICIANS:** Administer oxygen, if necessary; treat symptoms; reduce or eliminate exposure. Be observant for initial signs of pulmonary edema in the event of severe inhalation over-exposures.

**FIRE-FIGHTING MEASURES**

**FLASH POINT:** Not applicable.

**AUTOIGNITION TEMPERATURE:** Not applicable.

**FLAMMABILITY LIMITS (In air by volume, %):**

- **Lower (LEL):** Not applicable.

**Upper (UEL):** Not applicable.

**OTHER:** Not applicable.

This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire. Explosion Sensitivity to Static Discharge: Not sensitive. Explosion Sensitivity to Static Discharge: Not sensitive. Special Fire-Fighting Procedures: Not applicable. All firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

**ACCIDENTAL RELEASE MEASURES**

**LEAK RESPONSE:** Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of an oxygen deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate the immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Hydrogen Sulfide and Oxygen. The level of Hydrogen Sulfide must be below the TLV (see Section 2, Composition on Information on Ingredients) and the atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. If leaking incidentally from the cylinder, contact your supplier.

**HANDLING AND USE**

**WORK PRACTICES AND HYGIENE PRACTICES:** Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to Hydrogen Sulfide over-exposure and oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify the cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact the nearest distributor immediately. Eye wash stations/safety showers should be near areas where this gas mixture is used or stored. All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release. All work practices should minimize releases of Hydrogen Sulfide-containing gas mixtures.

**NON-FLAMMABLE GAS MIXTURE MSDS - 50019 EFFECTIVE DATE: APRIL 19, 2005**

**PAGE 2 OF 5**
8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this gas mixture in well-ventilated areas, with a local exhaust ventilation system, or in a dry, well-ventilated area with good air circulation. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of Hydrogen Sulfide and Oxygen.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respirators if the levels of components exceed exposure limits presented in Section 2 (Composition and Information of Ingredients) and Oxygen levels are below 19.16% or, if present, during emergency response to a release of this gas mixture. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Oxygen levels below 19.16% are considered IDLH by OSHA. In such circumstances, use of a full-facepiece pressure-demand SCBA or a full-facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1996).

RESPIRATORY PROTECTION: The following NIOSH respiratory protection recommendations for Hydrogen Sulfide are provided for further information.

NIOSH/OSHA RECOMMENDATIONS FOR HYDROGEN SULFIDE CONCENTRATIONS IN AIR: Up to 100 ppm: Powered air-purifying respirator with cartridge(s) to protect against hydrogen sulfide; or gas mask with canister to protect against hydrogen sulfide; or full-facepiece SCBA.

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Gas mask with canister to protect against hydrogen sulfide; or escape-type SCBA.

The IDLH concentration for Hydrogen Sulfide is 100 ppm.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Wear leather gloves when handling cylinders. Chemically resistant gloves should be worn when using this gas mixture. If necessary, refer to OSHA 29 CFR 1910.133 or applicable standards of Canadian Provinces.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Nitrogen, the main component of this gas mixture.

GAS DENSITY (Water): 1.07 lbs/ft³ (1.153 kg/m³)
FREZEE/MELTING POINT: 0°F (-18°C)
SPECIFIC HEAT (Water): 0.907

SOLUBILITY IN WATER: 0.023

EVAPORATION RATE: Not applicable

VAPOR PRESSURE: Not applicable

COEFFICIENT WATER/DIODE: Not applicable

The following information is for this gas mixture.

ODOR THRESHOLD: 0.13 ppm (Hydrogen Sulfide)

APPEARANCE AND COLOR: This gas mixture is a colorless gas which has an rotten egg-like odor, due to the presence of Hydrogen Sulfide.

HOW TO DETECT THIS SUBSTANCE (warning properties): Continuous inhalation of low concentrations of this gas mixture may cause olfactory fatigue, due to the presence of Hydrogen Sulfide, so the odor is not a good warning property of a release of this gas mixture. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation. Wet lead acetate paper can be used for leak detection. The paper turns black in the presence of Hydrogen Sulfide. Cadmium chloride solutions can also be used. Cadmium solutions will turn yellow upon contact with Hydrogen Sulfide.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The thermal decomposition products of Methane include carbon oxides. The decomposition products of Hydrogen Sulfide include water and sulfur oxides. The other components of this gas mixture do not decompose, per se, but can react with other compounds in the heat of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this gas mixture). Lithium reacts slowly with nitrogen at ambient temperatures. Components of this gas mixture (Hydrogen Sulfide and Methane) are also incompatible with strong oxidizers (i.e. chlorine, bromine perfluoride, oxygen difluoride, and nitrogen trifluoride). Hydrogen Sulfide is corrosive to most metals, because it reacts with these substances to form metal sulfides.

HAZARD FOR POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicity data are available for the components of this gas mixture:

NITROGEN: There are no specific toxicity data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.

METHANE: There are no specific toxicity data for Methane. Methane is a simple asphyxiant, which acts to displace oxygen in the environment.

HYDROGEN SULFIDE: LClO (Inhalation-Rat) 444 ppm: Lung, Thorax, or Respiratory; other changes; Gastrointestinal: hepatomegaly, diarrhea; Kidney, Uterus, Bladder: urine volume increased; LClO (Inhalation-Mouse) 634 ppm/hour; LClO (Inhalation-Human) 600 ppm/30 minutes; LClO (Inhalation-continued): change in blood or tissue levels: cytochrome oxidase (including oxidative phosphorylation).

HYDROGEN SULFIDE (continued): The following values are based on continuous exposure for 30 minutes to 90 hours/day, intermittent: Brain and Coverings: changes in brain weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain.

TCL0 (Inhalation-Rat) 30 ppm/6 hours/toxic: Sensory Organs and Special Senses (Olfaction): olfactory nerve damage; effect, not otherwise specified.

TCL0 (Inhalation-Rat) 1200 mg/m³/12 hours/5 days-intermittent: Brain and Coverings: other degenerative changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholesterole.

TCL0 (Inhalation-Rat) 100 ppm/h/5 weeks-intermittent: Brain and Coverings: other degenerative changes; Lung, Thorax, or Respiratory: other changes; Gastrointestinal: functional-Enzyme inhibition, induction.

SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITATION OF PRODUCT: Due to the presence of Hydrogen Sulfide, this gas mixture is irritating to the eyes, and may be irritating to the skin.

SENSITIZATION TO THE PRODUCT: No component of this gas mixture is known to be a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this gas mixture and its components on the human reproductive system.
11. TOXICOLOGICAL INFORMATION (Continued)

Mutagenicity: No mutagenicity effects have been described for the components of this gas mixture.

Embryotoxicity: No embryotoxic effects have been described for the components of this gas mixture.

Teratogenicity: No teratogenicity effects have been described for the components of this gas mixture.

Reproductive Toxicity: No reproductive toxicity effects have been described for the components of this gas mixture.

A hormone is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

BIological Exposure Indices (BEIs): Currently, Biological Exposure Indices (BEIs) have not been determined for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL SAFETY: The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this gas mixture.

HYDROGEN SULFIDE:
Water Solubility = 1 g/L at 20°C.

The following aquatic toxicity data are available for Hydrogen Sulfide:

<table>
<thead>
<tr>
<th>Species</th>
<th>LC50 (mg/L)</th>
<th>Exposure Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goldfish</td>
<td>4.3</td>
<td>24 hours</td>
</tr>
<tr>
<td>Brook trout</td>
<td>0.0308</td>
<td>96 hours</td>
</tr>
<tr>
<td>Bluegill, juveniles</td>
<td>0.0478</td>
<td>96 hours</td>
</tr>
<tr>
<td>Bluegill, adults</td>
<td>0.0448</td>
<td>96 hours</td>
</tr>
<tr>
<td>Fathead minnows</td>
<td>0.0371</td>
<td>96 hours</td>
</tr>
<tr>
<td>Brook trout</td>
<td>0.0131</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

Persistence: Converts to elemental sulfur upon standing in water. Major Species Threatened: Aquatic and animal life may be injured if exposed to 5 ppm in air over 24 hours. Sensitivity to a species is correlated to dose. At higher (3.25 and 5.03 ppm) Hydrogen Sulfide, significant reductions in leaf CO2 and water vapor exchanges occurred, and stomatal openings were depressed. When Hydrogen Sulfide gas was applied to 29 species of green plants for 5 hours, young, rapidly elongating tissues were more sensitive to injury than older tissues. Symptoms included scorching of young shoots and leaves, basal and marginal scorching of older leaves. Mature leaves were unaffected. Seeds exposed to Hydrogen Sulfide gas showed delay in germination. Biodegradation: Microorganisms in soil and water are involved in oxidation-reduction reactions that oxidize hydrogen sulfide to elemental sulfur. The members of the families Chlorobiaceae and Chromatiaceae (purple sulfur bacteria) are obligate aerobes and are phototrophic, and are found in waters with high H2S concentrations. The interactions of these organisms form part of the global sulfur cycle. Bioconcentration: Does not have bioaccumulation or food chain contamination potential.

OXYGEN: Water Solubility = 2.4 volumes Nitrogen/100 volumes water at 0°C. 1.6 volumes Nitrogen/100 volumes water at 20°C.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS: Due to the presence of Hydrogen Sulfide in this gas mixture, releases of this gas mixture can be harmful or fatal to plant and animal life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Hydrogen Sulfide, a component of this gas mixture, is harmful if released in an aquatic environment. All handling procedures should be aimed at preventing a release of Hydrogen Sulfide to the environment. The following aquatic toxicity data are available for Hydrogen Sulfide:

<table>
<thead>
<tr>
<th>Species</th>
<th>LC50 (mg/L)</th>
<th>Exposure Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goldfish</td>
<td>25</td>
<td>24 hours</td>
</tr>
<tr>
<td>Brook trout</td>
<td>0.0104</td>
<td>96 hours</td>
</tr>
<tr>
<td>Bluegill, adults</td>
<td>0.0448</td>
<td>96 hours</td>
</tr>
<tr>
<td>Fathead minnows</td>
<td>0.0371</td>
<td>96 hours</td>
</tr>
<tr>
<td>Brook trout</td>
<td>0.0131</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

Inhalation: (Flies) > 960 minutes = 380 mg/L

Toxicity (goldfish) 24 hours = 4.3 mg/L

Toxicity (tench) 3 hours = 100 mg/L

Toxicity (bluegill) 96 hours = 5.03 mg/L

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Preparing wastes for disposal: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

THIS GAS MIXTURE IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPANE SHIP NAME: Compressed gases, n.o.s. (*Oxygen, Nitrogen*) or the gas component with the next highest concentration next to Nitrogen.

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, App. B).

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is considered as Dangerous Goods, per regulations of Transport Canada.

PROPANE SHIP NAME: Compressed gases, n.o.s. (*Oxygen, Nitrogen*) or the gas component with the next highest concentration next to Nitrogen.

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: Non-Flammable Gas

SPECIAL SHIPMENTS: Not Applicable.

EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: None

ERAP INDEX: 0

PASSAGERS CARRYING CARRYING SHIP: Forbidden

PASSAGERS CARRYING ROAD VEHICLE OR PASSENGER CARRYING RAILWAY VEHICLE INDEX: Forbidden

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126

Note: Shipment of compressed gas cylinders via Public Passenger Road Vehicle is a violation of Canadian law (Transport Canada Transportation of Dangerous Goods Act, 1992).
ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: This gas mixture is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>SARA 302 (40 CFR 355, Appendix A)</th>
<th>SARA 304 (40 CFR Table 302.4)</th>
<th>SARA 313 (40 CFR 372.65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Sulfide</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

U.S. SARA THRESHOLD PLANNING QUANTITY: Hydrogen Sulfide = 500 lb (227 kg)

U.S. TSCA INVENTORY STATUS: The components of this gas mixture are listed on the TSCA Inventory.

U.S. CEVLA REPORTABLE QUANTITY (RQ): Hydrogen Sulfide = 100 lb (45 kg)

OTHER U.S. FEDERAL REGULATIONS:
- Hydrogen Sulfide is subject to the reporting requirements of CFR 29 1910.1000.
- Hydrogen Sulfide and Methane are subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for each of these gases is 10,000 pounds and so this mixture will not be affected by the regulation.
- Depending on specific operations involving the use of this gas mixture, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Hydrogen Sulfide is listed in Appendix A of this regulation. The Threshold Quantity for Hydrogen Sulfide under this regulation is 1500 lbs (and so one cylinder of this gas mixture will not be affected by this regulation).
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Hydrogen and Oxygen are not listed Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Hydrogen Sulfide is listed under this regulation in Table 1 as a Regulated Substance (Toxic Substance), in quantities of 10,000 lbs (4,553 kg) or greater.

U.S. STATE REGULATORY INFORMATION:
The components of this gas mixture are covered under the following specific State regulations:

- **California Proposition 65 lists**
- **ADDITIONAL CANADIAN REGULATIONS:**
  - **CANADIAN DLS/NDSL INVENTORY STATUS:** The components of this gas mixture are listed on the DSL Inventory.
  - **CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** The components of this gas mixture are not on the CEPA Priorities Substances Lists.
  - **CANADIAN WHMIS CLASSIFICATION:** This gas mixture is categorized as a Controlled Product, Hazard Classes A and D2A, as per the Controlled Product Regulations.

16. OTHER INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders ship as hazardous materials when full. When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that of any other waste or scrap metal content. CALGAZ, LLC will do this for any customer that wishes to return these cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scraping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to 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 make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

P-1 “Safe Handling and Compressed Gases in Containers”
AV-1 “Safe Handling and Storage of Compressed Gases”
“Handbook of Compressed Gases”

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This Material 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 gas mixture. To the best of CALGAZ, LLC 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 gas mixture 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.