MATERIAL SAFETY DATA SHEET
Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: METHANE/CARBON DIOXIDE/NITROGEN GAS MIXTURE

TRADE NAMES: None

CHEMICAL FAMILY: Hydrocarbon/Inert Gas/Carbon Dioxide Mixture

PRODUCT USE: Various

MANUFACTURER

MATHESON TRI-GAS, INC.

150 ALLEN ROAD, Ste 302
BASKING RIDGE, NJ  07920
USA
Phone: 973/257-1100

EMERGENCY PHONE:

CHEMTREC (U.S. DOMESTIC): 1-800-424-9300
CHEMTREC INTERNATIONAL: 1-703-527-3887
CANUTEC (CANADA): 1-613-996-6666

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. See Section 16 for Definitions of Terms Used.

2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Product Description: This gas mixture is a colorless, non-flammable gas which is odorless or which has a sharp odor (due to the presence of Carbon Dioxide). Health Hazards: A significant hazard associated with this gas mixture is the potential for Carbon Dioxide overexposures. Inhalation of this gas mixture can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Severe inhalation exposures may be fatal, due to Carbon dioxide overexposure or asphyxiation. Moisture in the air could lead to the formation of carbonic acid which can be irritating to the eyes. Flammability Hazards: This gas mixture is not flammable. A cylinder rupture hazard exists when this gas mixture, which is under pressure, is subject to heat or flames. Reactivity Hazards: This gas mixture is not reactive. Environmental Hazards: Release of this mixture is not expected to cause environmental harm. Emergency Response Considerations: Provide adequate fire protection during emergency response.

INHALATION: One of the most significant health hazards associated with this gas mixture is the potential for overexposure to Carbon Dioxide. Carbon Dioxide is an asphyxiant and a powerful cerebral vasodilator. If the concentration of Carbon Dioxide reaches 10% or more, suffocation can occur rapidly. Inhalation of concentrations between 2 and 10% can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Carbon Dioxide initially stimulates respiration and then causes respiratory depression. Inhalation of low concentrations of Carbon Dioxide (3-5%) have no known permanent harmful effects. Symptoms in humans at various levels of concentration are as follows:

<table>
<thead>
<tr>
<th>CARBON DIOXIDE CONCENTRATION</th>
<th>SYMPTOMS OF EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>Slight increase in breathing rate.</td>
</tr>
<tr>
<td>2%</td>
<td>Breathing rate increases to 50% above normal; headache; tiredness.</td>
</tr>
<tr>
<td>3%</td>
<td>Breathing increases to twice normal rate, becoming labored; weak narcotic effect; impaired hearing; headache; increase in blood pressure and pulse rate.</td>
</tr>
<tr>
<td>4-5%</td>
<td>Breathing increases to four times normal rate; symptoms of intoxication become evident and slight choking may be felt.</td>
</tr>
</tbody>
</table>
2. HAZARD IDENTIFICATION (Continued)

INHALATION (continued):

CARBON DIOXIDE

CONCENTRATION SYMPTOMS OF EXPOSURE

5-10%: Characteristic sharp odor noticeable. Very labored breathing, headache, visual impairment and ringing in the ears. Judgment may be impaired, followed by loss of consciousness.

>10%: Unconsciousness occurs more rapidly above 10% level. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.

In addition, high concentrations of this gas mixture can cause an oxygen-deficient environment, especially if released in a poorly-ventilated area (e.g., an enclosed or confined space). 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 overexposure, death may occur. The effects associated with various levels of oxygen are as follows:

<table>
<thead>
<tr>
<th>CONCENTRATION OF OXYGEN</th>
<th>OBSERVED EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-16% Oxygen:</td>
<td>Breathing and pulse rate increase, muscular coordination slightly disturbed.</td>
</tr>
<tr>
<td>10-14% Oxygen:</td>
<td>Emotional upset, abnormal fatigue, disturbed respiration.</td>
</tr>
<tr>
<td>6-10% Oxygen:</td>
<td>Nausea, vomiting, collapse, or loss of consciousness.</td>
</tr>
<tr>
<td>Below 6%:</td>
<td>Convulsive movements, possible respiratory collapse, and death.</td>
</tr>
</tbody>
</table>

WARNING: Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

It should be noted that before adverse health effects or suffocation could occur, the lower flammability limits of the components of this gas mixture in air may be exceeded, possibly causing an explosive atmosphere as well as an oxygen-deficient environment. It is important to note that the asphyxiating properties of Carbon Dioxide will be reached before oxygen-deficiency is a significant factor.

CONTACT WITH SKIN or EYES: Moisture in the air could lead to the formation of carbonic acid, which can be irritating to the eyes. Contact with the eyes can cause damage to the retinal ganglion cells.

SKIN ABSORPTION: No component of this gas mixture presents a hazard of skin absorption.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Depending on the concentration of Carbon Dioxide, inhalation of this gas mixture cause nausea, dizziness, visual disturbances, shaking, headache, mental confusion, sweating, increased heartbeat, and elevated blood pressure and respiratory rate. Severe inhalation overexposures may be fatal, due the effects of Carbon Dioxide or asphyxiation. High concentrations of the gas mixture may cause eye irritation.

CHRONIC: Reversible effects on the acid-base balance in the blood, blood pressure, and circulatory system may occur after prolonged exposure to elevated Carbon Dioxide levels. Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system.

TARGET ORGANS: ACUTE: Respiratory system, cardiovascular system, eyes. CHRONIC: Cardiovascular system, central nervous system.

HMIS RATING: HEALTH = 1 FLAMMABILITY = 0 REACTIVITY = 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

3. COMPOSITION and INFORMATION ON INGREDIENTS

(10,000 ppm = 1%)

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>mole %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>1.0-75.0%</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>124-38-9</td>
<td>1.0-50.0%</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
<td>Balance</td>
</tr>
</tbody>
</table>
4. FIRST-AID MEASURES

GENERAL INFORMATION: Remove to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Seek medical attention immediately.

SKIN EXPOSURE: If release of this gas mixture has resulted in frostbite, warm affected area slowly. Seek immediate medical attention.

EYE EXPOSURE: If release of this gas mixture has affected the eyes, seek immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions, cardiovascular conditions and disorders involving the “Target Organs” (see Section 3, Hazard Identification) may be aggravated by overexposure to this gas mixture.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable-non-flammable gas.

FLAMMABLE LIMITS (in air by volume, %):
  Lower (LEL): Not applicable.  Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Use extinguishing materials appropriate for surrounding materials involved in the fire. Water spray should be used to cool fire-exposed containers.

FIRE EXTINGUISHING MATERIALS NOT TO BE USED: None known.

UNUSUAL FIRE AND EXPLOSION HAZARD: This gas mixture does not burn; however, cylinders, when involved in a fire, may rupture or burst in the heat of the fire.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Immediately cool the cylinders with water spray from a maximum distance. When cool, move cylinders from fire area if this can be done without risk to firefighters.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used in the event of a significant release from a single cylinder. Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666).

Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there. Monitor the surrounding area for the level of Oxygen. The atmosphere must have at least 19.5 percent Oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES

Do not eat or drink while handling chemicals.

Be aware of all potential exposure symptoms; exposures to a fatal oxygen-deficient atmosphere could occur without any significant warning symptoms.

All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release.

Workers who handle this gas mixture should wear protective clothing, as listed in Section 8 (Exposure Controls and Personal Protection).

If ventilation controls are not adequate to provide sufficient oxygen content, proper respiratory protection equipment should be provided and workers using such equipment should be carefully trained in its operation and limitations.
7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES (continued):
Precautions must always be taken to prevent suck-back of foreign materials into the cylinder by using a check-valve, or vacuum break, since suck-back may cause dangerous pressure changes within the cylinder.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored upright and be firmly secured to prevent falling or being knocked-over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat or ignition. Do not allow area where cylinders are stored to exceed 52°C (125°F).

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Compressed gases can present significant safety hazards. The following rules are applicable to work situations in which cylinders are being used.

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not use oils or grease on gas-handling fittings or equipment. Immediately contact the supplier if there are any difficulties associated with operating the cylinder valve. Never insert an object (e.g wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage the valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc, on a compressed gas cylinder or make a cylinder part of an electric circuit.

After Use: Close main cylinder valve. Replace valve protection cap. Close valve after each use and when empty. Mark empty cylinders “EMPTY”.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Refer to current CGA Guidelines for information on protective practices during maintenance of contaminated equipment.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate, explosion-proof ventilation to ensure compliance with exposure limits described in this section. Local exhaust ventilation is preferred, because it prevents dispersion of this gas mixture into the workplace by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of Oxygen and the presence of potentially explosive air-gas mixtures.

EXPOSURE LIMITS:

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>ACGIH-TLVs</th>
<th>OSHA-STELs</th>
<th>NIOSH-RELs</th>
<th>NIOSH</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TWA ppm</td>
<td>STEL ppm</td>
<td>TWA ppm</td>
<td>STEL ppm</td>
<td>TWA ppm</td>
<td>STEL ppm</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>124-38-9</td>
<td>5000</td>
<td>30,000</td>
<td>5000</td>
<td>30,000</td>
<td>5000</td>
</tr>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>1000</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
</tbody>
</table>
| Nitrogen | 7727-37-9 | There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.

See Section 16 for Definitions of Terms Used.

RESPIRATORY PROTECTION: Maintain the Oxygen level above 19.5% in the workplace. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent U.S. State standards and Canadian CSA Standard Z94.4-93. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, 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 (1910.134-1998). The following NIOSH respiratory protection recommendations for Carbon Dioxide concentrations in air are provided for additional guidance in respirator selection:

**CARBON DIOXIDE CONCENTRATION**
Up to 40,000 ppm: Supplied Air Respirator (SAR); or full-facepiece Self-Contained Breathing Apparatus (SCBA).
8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION (continued):
CARBON DIOXIDE (continued)

<table>
<thead>
<tr>
<th>CONCENTRATION</th>
<th>RESPIRATORY EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions:</td>
<td>Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.</td>
</tr>
<tr>
<td>Escape:</td>
<td>Escape-type SCBA.</td>
</tr>
</tbody>
</table>


BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to the task. If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee’s feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-02, Protective Footwear.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

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9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Nitrogen, a main component of this gas mixture:

- **GAS DENSITY:** 0.072 lb/cu ft (1.153 kg/m³)
- **EVAPORATION RATE (nBuAc = 1):** Not applicable.
- **SPECIFIC GRAVITY (air = 1):** 0.967
- **FREEZING POINT:** -209.9°C (-345.8 °F)
- **SPECIFIC GRAVITY (gas) @ 21°C:** 1.52
- **EVAPORATION RATE (nBuAc = 1):** Not applicable
- **SOLUBILITY IN WATER:** 0.023
- **FREEZING POINT (at 1 atmos.):** -195.8°C (-320.4°F)
- **EXPANSION RATIO:** Not applicable
- **VAPOR PRESSURE (psig):** 830
- **SPECIFIC VOLUME (ft³/lb):** 13.89
- **ODOR THRESHOLD:** Not applicable
- **SOLUBILITY IN WATER @ 20°C:** 0.90%
- **ODOR THRESHOLD:** Not applicable
- **EXPANSION RATIO:** Not applicable
- **BOILING POINT @ 1 atm:** -195.8°C (-320.4°F)
- **ODOR THRESHOLD:** Not applicable
- **COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable

The following information is pertinent for Carbon Dioxide, a main component of this gas mixture.

- **GAS DENSITY @ 21°C and 1 atm:** 0.1144 lb/ft³ (1.833 kg/m³)
- **SPECIFIC GRAVITY (gas) @ 21°C:** 1.52
- **EVAPORATION RATE (nBuAc = 1):** Not applicable
- **VAPOR PRESSURE (psig):** 830
- **SPECIFIC VOLUME (ft³/lb):** 8.8
- **SOLUBILITY IN WATER @ 20°C:** 0.90%
- **ODOR THRESHOLD:** Not applicable
- **EXPANSION RATIO:** Not applicable
- **BOILING POINT @ 1 atm (sublimation point):** -78.5°C (-109.3°F)
- **TRIPLE POINT @ 60.4 psig (416 kPa):** -56.6°C (-69.9°F)
- **COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable

The following information is pertinent to this gas mixture:

- **APPEARANCE, ODOR AND COLOR:** This gas mixture is colorless and odorless, or may have a sharp odor (depending on the level of Carbon Dioxide).
- **HOW TO DETECT THIS SUBSTANCE (warning properties):** There are no distinct warning properties of this gas mixture, unless the Carbon Dioxide is at a high concentration, when the odor may be a warning property. 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.

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10. STABILITY and REACTIVITY

**STABILITY:** Stable at standard temperatures and pressures.

**DECOMPOSITION PRODUCTS:** The Carbon Dioxide component will produce Carbon Monoxide and Oxygen when heated to temperatures above 3000°F (1648°C). The Methane component of this gas mixture will decompose into carbon dioxide and carbon monoxide at extremely high temperatures. The Nitrogen component of this gas mixture does not decompose, per se, but may react with other compounds in the heat of a fire.
10. STABILITY and REACTIVITY (Continued)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Due to the presence of Carbon Dioxide, this gas mixture may be incompatible with a variety of metals, alloys, and metal acetylides (e.g., aluminum, chromium, and zirconium). Carbon Dioxide will react with alkaline materials to form carbonates and bicarbonates. The Methane component of this gas mixture is incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen difluoride, and nitrogen trifluoride). The Nitrogen component of this gas mixture is inert.

HAZARDOUS 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: Nitrogen and Methane are simple asphyxiants (SA), which act to displace oxygen in the environment. The following data are available for the Carbon Dioxide component of this gas mixture.

**CARBON DIOXIDE:**
- $L_{CL_0}$ (inhalation, human) = 9 ppm/5 minutes.
- $L_{CL_0}$ (inhalation, mammal) = 90000 ppm/5 minutes.
- $T_{CL_0}$ (inhalation, rat) = 6 ppm/24 hours; reproductive and teratogenic effects.

CARCINOGENIC POTENTIAL OF COMPONENTS: The components of this gas mixture are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, or ACGIH, and therefore are not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Due to the formation of carbonic acid, this gas mixture can be slightly irritating to contaminated eyes.

SENSITIZATION TO THE PRODUCT: The components of this product not known to be skin or respiratory sensitizers.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of the components of this gas mixture on the human reproductive system.

- **Mutagenicity:** The components of this gas mixture are not reported to cause mutagenic effects in humans.
- **Embryotoxicity:** The components of this gas mixture are not reported to cause embryotoxic effects in humans.
- **Teratogenicity:** The components of this gas mixture are not reported to cause teratogenic effects in humans. Clinical studies involving test animals exposed to high concentrations of Carbon Dioxide indicate teratogenic effects (e.g., cardiac and skeletal malformations, stillbirths).
- **Reproductive Toxicity:** The components of this gas mixture are not reported to cause adverse reproductive effects in humans. Studies involving test animals exposed to high concentrations of Carbon Dioxide show effects (e.g. changes in testes).

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas mixture will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen deficient environments.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No an adverse effect from this gas mixture on aquatic life is expected.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Matheson Tri-Gas. Do not dispose of locally.
14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (Methane, Nitrogen, Carbon Dioxide)
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not Applicable
D.O.T HAZARD LABEL: Class 2.2 Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as a Marine Pollutants (as defined by 49 CFR 172.101, Appendix 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 present serious safety hazards and should be discouraged.

NOTE: Shipment of compressed gas cylinders which have not been filled with the owner’s consent is a violation of Federal law (49 CFR, Part 173.301 (b)).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is classified as dangerous goods, per regulations of Transport Canada.

PROPER SHIPPING NAME: Compressed gas, n.o.s. (Methane, Nitrogen, Carbon Dioxide)
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not Applicable
HAZARD LABEL: 2.2 (Non-Flammable Gas)
SPECIAL PROVISIONS: None
EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: 0.125
ERAP INDEX: None
PASSENGER CARRYING SHIP INDEX: None
PASSENGER CARRYING ROAD VEHICLE OR PASSENGER CARRYING RAILWAY VEHICLE INDEX: 75
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): 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).

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: No component of this product is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. SARA HAZARD CATEGORIES (SECTION 311/312, 40 CFR 370-21): ACUTE: No; CHRONIC: No; FIRE: No; REACTIVE: No; SUDDEN RELEASE: Yes

U.S. TSCA INVENTORY STATUS: Components of this product are listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS: Methane is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The threshold quantity for Methane is 10,000 lbs (4,540 kg). Methane is listed as a Regulated Substance in quantities of 10,000 lbs (4,540 kg) or greater, per 40 CFR, Part 68 of the Risk Management for Chemical Accidental Release.

U.S. STATE REGULATORY INFORMATION: Components of this product are covered under some

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is on the California Proposition 65 lists.

LABELING: Cylinders of this gas mixture should be labeled for precautionary information per the guidelines of the CGA. Refer to the CGA for further information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The components of this product are listed on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.
15. REGULATORY INFORMATION (Continued)

ADDITIONAL CANADIAN REGULATIONS (continued):
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this product are not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This gas mixture would be categorized as a Controlled Product, Hazard Classes: A (compressed gas). The following symbol is required for WHMIS compliance for this gas mixture.

16. OTHER INFORMATION

CREATION DATE: April 4, 2004 REVISION DATE: August 20, 2008
REVISION HISTORY: Up-date MSDS to current ANSI Standard format.

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 use 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 can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 421 Walney Road, 5th Floor, Chantilly, VA 20151. Telephone: (703) 788-2700, Fax: (703) 961-1831.

“Safe Handling of Compressed Gases in Containers” (P-1, 1999)
“Safe Handling and Storage of Compressed Gases” (AV-1, 1999)
“Handbook of Compressed Gases” (1992)

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
800/441-3365 / 619/670-0609

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed.

DFG MAK Pregnancy Risk Group Classification (continued): Group B: Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed.

Group C: There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed.

Group D: Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

LQG: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH’s Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA’s Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA.

The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, “Vacated 1989 PEL,” is placed next to the PEL that was vacated by Court Order.

SKIN: Used when there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

EXPOSURE LIMITS IN AIR (continued):

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated.

Skin Irritation: Essentially non-irritating. PII or Draize = “0”.

Eye Irritation: Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation], Draize = “0”.

1 (Slight Hazard: Minor reversible Injury may occur; slightly or mildly irritating. Skin Irritation: Slightly or mildly irritating. Eye Irritation: Slightly or mildly irritating. Oral Toxicity LD50 Rat: > 500-5000 mg/kg. Dermal Toxicity LD50 Rat or Rabbit: > 200-1000 mg/kg. Inhalation Toxicity LC50 Rat: > 1000-2000 mg/L) 2 (Moderate Hazard: Temporary or transitory injury may occur. Skin Irritation: Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. Eye Irritation: Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. Oral Toxicity LD50 Rat: > 50-500 mg/kg. Dermal Toxicity LD50 Rat or Rabbit: > 200-1000 mg/kg. Inhalation Toxicity LC50 Rat: > 0.5-2 mg/L). 3 (Serious Hazard; Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. Skin Irritation: Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. Eye Irritation: Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. Oral Toxicity LD50 Rat: > 1-50 mg/kg. Dermal Toxicity LD50 Rat or Rabbit: > 20-200 mg/kg. Inhalation Toxicity LC50 Rat: > 0.05-0.5 mg/L); 4 (Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposure. Skin Irritation: Not appropriate. Do not rate as a “4”, based on skin irritation alone. Eye Irritation: Not appropriate. Do not rate as a “4”, based on eye irritation alone. Oral Toxicity LD50 Rat: ≤ 1 mg/kg. Dermal Toxicity LD50 Rat or Rabbit: ≤ 20 mg/kg. Inhalation Toxicity LC50 4-hrs Rat: ≤ 0.05 mg/L).
HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARD RATINGS (continued):

<table>
<thead>
<tr>
<th>Description</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability Hazard</td>
<td>0 (Minimal Hazard)</td>
</tr>
<tr>
<td>Physical Hazard</td>
<td>0 (Water Reactivity)</td>
</tr>
<tr>
<td>Health Hazard (continued)</td>
<td>3 (continued): Pyrophoric; No Rating. Oxidizers: Packing Group I: Solids; any material that, in either concentration tested, exhibits a mean burning time of less than or equal to 30 seconds under typical fire conditions, can cause severe injury to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers.</td>
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NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

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<tr>
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<td>Health Hazard (continued)</td>
<td>No Specific Rating. Oxidizers: Substances that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials are not explosive in nature but will produce a destructive effect upon contact with water. Materials that, in either concentration tested, exhibit a mean burning time of less than or equal to 30 seconds under typical fire conditions, can cause severe injury to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers.</td>
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DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 1 (continued): Materials that will burn in air when exposed to a temperature of 816°F (1500°F) for a period of 5 minutes in accordance with AccessLD. Liquids that cause any solids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIb liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the Method of Testing for Sustained Combustibility, per 49 CFR 173. Appendix H or the UN Recommendations on the Transport of Dangerous Goods, Model Regulations (current edition) and the related Manual of Tests and Criteria (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid (solid). Contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree will not under normal conditions form hazardous atmospheres with air, but under extreme ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 78.9°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 240 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flame fire hazards, such as cotton, sial and hemp. Solids and semisolids that readily give off flammable vapors. Liquids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 3 Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperature changes, are readily ignited under almost any environmental conditions: Liquids, having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 4 Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily: Flammable cryogenic materials. Any liquids having a flash point at or above 78.9°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. 1 Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 0.1 W/mL. Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.1 W/mL and below 10 W/mL. Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: Lb - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; Lc - Lethal Concentration (gases) which kills 50% of the exposed animals; ppm concentration expressed in parts of million per million parts of air or water; mg/m³ concentration expressed in weight of substance per volume of air; mg/kg quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include TDL0, the lowest dose to cause a symptom and TCL0 the lowest concentration to cause a symptom; TLoD, DL0, and DLo or TC, Tc0, Lc0, and LCo, the lowest dose (or concentration) to cause lethal or toxic effects.

Cancer Information: The sources are: IARC - the International Agency for Research on Cancer; NTP - the National Toxicology Program, RTECS - the Registry of Toxic Effects of Chemical Substances, OSHA and CAL/OSHA. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other Information: BEI - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

ECOLOGICAL INFORMATION:

BCF = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. EC is the Effect Concentration in water. EEC is the Effect Concentration for 50% of the organisms exposed; NOEC is the No Observed Effect Concentration; MATC is the Maximum Acceptable Toxicant Concentration; NOLC is the No Observed Lethal Concentration. Tm = median threshold limit; Coefficient of Oil/Water Distribution is represented by log Kow or log Koc and is used to assess a substance’s behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA: This section explains the impact of various laws and regulations on the material. EPA is the U.S. Environmental Protection Agency. WHMIS is the Canadian Workplace Hazardous Materials Information System. DOT and TC are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (SARA); the Canadian Domestic/Non-Domestic Substances List (DSL/NDSL). The U.S. Toxic Substance Control Act (TSCA); Marine Pollutant status according to the DOT; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund); and various state regulations. This section also includes information on the precautionary warnings which appear on the material’s package label.