Product Name: Methane in Ar/He/N2 or Air

DOT ID No: UN 1956  DOT Hazard Class: 2.2  Emergency No: +97-1-5-5336481  MSDS No: GM-007

DOT Shipping Label: Non Flammable Gas

Date last updated: 03/10/2009  Revision No: 00

Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>Mole %</th>
<th>Exposure Limits in Air</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH-TLV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OSHA-STEEL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NIOSH IDLH ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other ppm</td>
</tr>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>≤ 5.0 in Air</td>
<td>TWA ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 10 in Ar</td>
<td>STEL ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 12 in He</td>
<td>TWA ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤14.3 in N2</td>
<td>STEL ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIC=1000</td>
<td>Other ppm</td>
</tr>
<tr>
<td>Air</td>
<td>132259-10-0</td>
<td>Compressed Air is a mixture of approximately 79% N2, 21% O2 and other trace gases. No exposure limits are applicable to Air, N2 or O2.</td>
<td></td>
</tr>
<tr>
<td>Argon</td>
<td>7440-37-1</td>
<td>There are no specific exposure limits for Ar. Ar is a simple asphyxiant (SA). O2 levels should be maintained at 19.5%.</td>
<td></td>
</tr>
<tr>
<td>Helium</td>
<td>7440-59-7</td>
<td>There are no specific exposure limits for He. He is a simple asphyxiant (SA). O2 levels should be maintained at 19.5%.</td>
<td></td>
</tr>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
<td>There are no specific exposure limits for N2. N2 is a simple asphyxiant (SA). O2 levels should be maintained at 19.5%.</td>
<td></td>
</tr>
</tbody>
</table>

Balance of this gas mixture consists of one of the following inert gas or air

Hazard Identification

EMERGENCY OVERVIEW: This is a colorless, odorless, non-flammable gas mixture. The main health hazard associated with releases of this gas mixture is asphyxiation by displacement of oxygen, as each component of this mixture is a simple asphyxiant. A cylinder rupture hazard exists when this gas mixture, which is under pressure, is subject to heat or flames.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation.

INHALATION: 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>
</tbody>
</table>
CONTACT WITH SKIN or EYES: Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite.

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:** The most significant hazard associated with this gas mixture is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include ringing in ears, headaches, shortness of breath, wheezing, dizziness, indigestion, and nausea. At high concentrations, unconsciousness or death may occur.

**CHRONIC:** Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system.

**TARGET ORGANS:** ACUTE: Respiratory system. CHRONIC: Cardiac system, central nervous system.

**HMIS RATING:**
- HEALTH HAZARD = 0
- FLAMMABILITY HAZARD = 0
- PHYSICAL HAZARD = 0

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

**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 may be aggravated by overexposure to this gas mixture.

**Fire Fighting Measures**

**FLASH POINT:** Not applicable.

**AUTOIGNITION TEMPERATURE:** Not applicable.

**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.

**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.
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.

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.

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.

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.

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 the 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 cylinder valve. Never insert an object (e.g wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove overtight or rusted caps. Never strike an arc, on a compressed gas cylinder or make a cylinder part of any 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.
Exposure Controls – Personal Protection

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure compliance with exposure limits described in Section 2 (Composition and Information on Ingredients). Local exhaust ventilation is preferred, because it prevents dispersion of this gas mixture into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of Oxygen.

RESPIRATORY PROTECTION: Maintain the level Oxygen 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).

EYE PROTECTION: Splash goggles or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or Canadian Standards.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders containing this gas mixture. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to the task. 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.

Physical and Chemical Properties

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

- **GAS DENSITY:** 0.07493 lb/cu ft (1.2 kg/m³)
- **SPECIFIC GRAVITY (air = 1):** 1
- **SPECIFIC GRAVITY IN WATER:** 0.0292
- **EXPANSION RATIO:** Not applicable.
- **ODOR THRESHOLD:** Not applicable.
- **VAPOR PRESSURE (psia):** Not applicable.
- **COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING POINT: -216.2°C (-357.2°F)
BOILING POINT (at 1 atmos.): -194.3°C (-317.7°F)
SPECIFIC VOLUME (ft³/lb): 13.346
MOLECULAR WEIGHT: 28.975

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

- **GAS DENSITY:** 0.103 lb/cu ft (1.650 kg/m³)
- **SPECIFIC GRAVITY (air = 1):** 1.138
- **SOLUBILITY IN WATER:** 0.056
- **EXPANSION RATIO:** Not applicable.
- **ODOR THRESHOLD:** Not applicable.
- **VAPOR PRESSURE (psia):** Not applicable.
- **COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING POINT: -189.2°C (-308.9°F)
BOILING POINT (at 1 atmos.): -185.9°C (-302.6°F)
SPECIFIC VOLUME (ft³/lb): 9.71
MOLECULAR WEIGHT: 39.95

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

- **GAS DENSITY:** 0.103 lb/cu ft (1.165 kg/m³)
- **SPECIFIC GRAVITY (air = 1):** 0.138
- **SOLUBILITY IN WATER:** 0.0094
- **EXPANSION RATIO:** Not applicable.
- **ODOR THRESHOLD:** Not applicable.
- **VAPOR PRESSURE (psia):** Not applicable.
- **COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING POINT: -268.9°C (-452.1°F)
BOILING POINT (at 1 atmos.): -268.9°C (-452.1°F)
SPECIFIC VOLUME (ft³/lb): 97.09
MOLECULAR WEIGHT: 4.00

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

- **GAS DENSITY**: 0.072 lb/cu ft (1.153 kg/m³)
- **SPECIFIC GRAVITY (air = 1)**: 0.967
- **SOLUBILITY IN WATER**: 0.023
- **EXPANSION RATIO**: Not applicable.
- **ODOR THRESHOLD**: Not applicable.
- **VAPOR PRESSURE (psia)**: Not applicable.
- **COEFFICIENT WATER/OIL DISTRIBUTION**: Not applicable.

The following information is pertinent to this product:

- **APPEARANCE, ODOR AND COLOR**: This gas mixture is colorless and odorless.

- **HOW TO DETECT THIS SUBSTANCE (warning properties)**: There are no distinct warning properties 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.

**Stability and Reactivity**

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

- **DECOMPOSITION PRODUCTS**: The Methane component of this gas mixture will decompose into carbon dioxide and carbon monoxide at extremely high temperatures. The inert gas components of this product does not decompose, per se, but may react with other compounds in the heat of a fire.

- **MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE**: The Methane component of this gas mixture is incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen difluoride, and nitrogen trifluoride). The inert balance gas components, are relatively inert gases.

- **HAZARDOUS POLYMERIZATION**: Will not occur.

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

**Toxicological Information**

- **TOXICITY DATA**: Argon, Helium, Nitrogen and Methane are simple asphyxiants (SA), which act to displace oxygen in the environment.

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

- **IRRITANCY OF PRODUCT**: This gas mixture is not irritating to contaminated tissue.

- **SENSITIZATION TO THE PRODUCT**: The components of this product are 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.

Reproductive Toxicity: The components of this gas mixture are not reported to cause adverse reproductive effects in humans.

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

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 adverse effect from this gas mixture on aquatic life is expected.

Disposal Consideration

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.

Transportation Information

PROPER SHIPPING NAME: Compressed gases, n.o.s.
(Methane, Argon) or (Methane, Helium)
or (Methane, Nitrogen) or (Methane, Air)

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

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not applicable.

D.O.T HAZARD LABEL: 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 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 considered as dangerous goods, per regulations of Transport Canada.

PROPER SHIPPING NAME: Compressed gases, n.o.s.
(Methane, Argon) or (Methane, Helium) or (Methane, Nitrogen) or (Methane, Air)

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

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not Applicable

HAZARD LABEL: Class 2.2 (Non-Flammable Gas)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: 0.12

ERAP INDEX: None

PASSENGER CARRYING SHIP INDEX: None

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

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