

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE

Containing One or Both of the Following Components in a Nitrogen Balance Gas:

Nitrogen Dioxide: 0.0001-0.022%; Oxygen: 0-23.5%

NOTE: MIXTURES COMPRISED OF AN AIR BALANCE GAS CONTAIN BETWEEN 19.5-23.5% OXYGEN.

SYNONYMS: Not Applicable

CHEMICAL FAMILY NAME: Not Applicable

FORMULA: Not Applicable

Document Number: 50022 (Replaces ISC MSDS No.1810-1477,1810-2219, 1810-2897, 1810-4976, 1810-5585, 1810-5452, 1810-6252, 1810-6776, 1810-7474, 1810-7730, 1810-5882)

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
ADDRESS:	821 Chesapeake Drive Cambridge, MD 21613
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	1-410-228-6400
	General MSDS Information: 1-713/868-0440
	Fax on Demand: 1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA		NIOSH IDLH ppm	OTHER ppm
			TWA ppm	STEL ppm	TWA ppm	STEL ppm		
Nitrogen Dioxide	10102-44-0	0.0005-0.022%	3	5	NE	5 (ceiling) 1 (Vacated 1989 PEL)	20	NIOSH RELs: STEL = 1 DFG MAKs: TWA = 5 PEAK = 1•MAK, 15 min., momentary value, 1 hr interval Carcinogen: TLV-A4
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%.					

NE = Not Established.

See Section 16 for Definitions of Terms Used.

NOTE (1): 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.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This gas mixture is a colorless, to red-brown, oxidizing gas which is either odorless or has an acrid odor. The Nitrogen Dioxide component of this gas mixture is extremely toxic by inhalation, and symptoms of over-exposure may not become apparent for up to 72 hours. Over-exposures to this gas mixture may result in severe irritation and burns of eyes, skin, mucous membranes, and any other exposed tissue. If high concentrations of Nitrogen Dioxide (> 100 ppm) are inhaled, delayed pulmonary damage and breathing difficulty may occur. 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. If this gas mixture is released in a small, poorly-ventilated area (i.e. an enclosed or confined space), there is a potential for inhalation over-exposures to Nitrogen Dioxide. Such over-exposure can result in serious health consequences, especially if the Nitrogen Dioxide concentration is over 100 ppm. Unless otherwise noted, the information presented for symptoms which can develop after over-exposure to specific concentrations of Nitrogen Dioxide are in ranges which exist in this gas mixture. Exposure to Nitrogen Dioxide gas in low concentrations produces an irritating effect on the mucous membranes of the eyes, nose, throat, and lungs. Acute exposure through inhalation may result in dryness and irritation of the nose and throat, choking, coughing, and bronchospasm. Severe over-exposure may cause death through systemic, delayed pulmonary edema. Exposure to high concentrations may cause unconsciousness, and under some circumstances, death.

INHALATION (continued): Typical symptoms of over-exposure to Nitrogen Dioxide are as follows:

NITROGEN DIOXIDE

CONCENTRATION OBSERVED EFFECT

25 ppm for 8 hours

Delayed (5 - 72 hours) pulmonary irritation

100 - 150 ppm

Delayed (5-48 hours) pulmonary edema and for 30 - 60 minutes symptoms of pulmonary dysfunction.

200 - 700 ppm

Severe pulmonary damage may result after a delay any exposure of 5-8 hours.

NOTE:

This gas mixture contains a maximum of 220 ppm Nitrogen Dioxide. Data pertinent to higher concentrations of Nitrogen Dioxide are provided to give complete information on effects observed in humans after over-exposures have occurred.

3. HAZARD IDENTIFICATION (Continued)

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 listed on the following page.

CONCENTRATION OF OXYGEN

12-16% Oxygen:

10-14% Oxygen:
6-10% Oxygen:
Below 6%:

OBSERVED EFFECT

Breathing and pulse rate increased, muscular coordination slightly disturbed.

Emotional upset, abnormal fatigue, disturbed respiration.
Nausea, vomiting, collapse, or loss of consciousness.
Convulsive movements, possible respiratory collapse, and death.

CONTACT WITH SKIN or EYES: Due to the presence of Nitrogen Dioxide, this gas mixture can be irritating to the skin if exposure is for prolonged periods, especially in a moist environment. Symptoms of skin over-exposure may include scratchiness, pain, and redness. If this gas mixture contaminates the eyes, severe injury and swelling of the eye tissue may occur. Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside.

SKIN ABSORPTION: Skin absorption is a significant route of exposure for Nitrogen Dioxide following prolonged, low-level exposure. Symptoms of over-exposure would include those described for "Contact with Skin and Eyes."

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this gas mixture, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. Due to the presence of Nitrogen Dioxide, this gas mixture is potentially damaging to the respiratory system. Over-exposures may result in severe irritation and burns of eyes, skin, mucous membranes, and any other exposed tissue. If high concentrations of Nitrogen Dioxide (> 100 ppm) are inhaled, delayed pulmonary damage and breathing difficulty may occur. Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

CHRONIC: Due to the presence of Nitrogen Dioxide, prolonged or repeated over-exposures this gas mixture may cause respiratory problems, bronchitis, hacking cough, nasal irritation and discharge, increased fatigue, alteration in the senses of taste and smell. Repeated over-exposures to Nitrogen Dioxide can also result in dental erosion and gum disorders.

TARGET ORGANS: ACUTE: Respiratory system, central nervous system, skin, eyes. CHRONIC: Skin, respiratory system, heart, teeth.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM		
HEALTH HAZARD	(BLUE)	3
FLAMMABILITY HAZARD	(RED)	0
PHYSICAL HAZARD	(YELLOW)	0
PROTECTIVE EQUIPMENT		
EYES	RESPIRATORY	HANDS
BODY		
See Section 8		
For Routine Industrial Use and Handling Applications		

4. 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) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary.

Take copy of label and 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.

In the event of severe over-exposures in which the victim is unconscious, vomiting may occur as the person awakes. In order to prevent aspiration, exposed individuals should be placed on their side with their head at the level or slightly lower than their body. Due to the possibility of the victim developing pulmonary edema, the symptoms of which can be delayed up to 72 hours, the victim should be discouraged from physical exertion during this time period.

SKIN EXPOSURE: If this gas mixture contaminates the skin, 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.

NOTICE! In the event of severe over-exposures, delayed onset of life-threatening symptoms may occur. Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s). Medical care providers should refer to Section 11 (Toxicological Information) of this MSDS for additional information.

EYE EXPOSURE: If irritation of the eye develops after exposure to the 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.

5. 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.

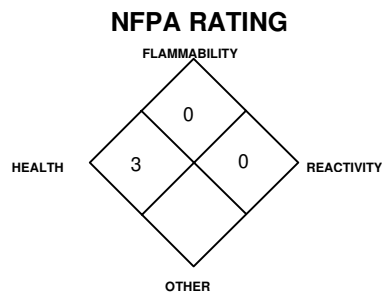
FIRE EXTINGUISHING MATERIALS: Non-flammable gas. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture contains Nitrogen Dioxide, which is toxic and presents a health hazard to fire-fighters. This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire. Pressure in a container can build-up due to heat and it may rupture if pressure relief devices should fail to function.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.



6. 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 associated with Nitrogen Dioxide over-exposure, an oxygen-deficient environment, or 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 immediate area. Uncontrolled 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. Adequate fire protection must be provided. Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Nitrogen Dioxide and Oxygen. The level of Nitrogen Dioxide must be below levels indicated in Section 2 (Composition and Information on Ingredients) and Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

STORAGE AND HANDLING PRACTICES: Be aware of any signs of dizziness or breathing difficulty, especially if work is done in poorly ventilated areas; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to Nitrogen Dioxide over-exposure or an oxygen-deficient environment. Eye wash stations/safety showers should be near areas where this gas mixture is used or stored. Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature approximately 21°C (70°F). Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition

7. HANDLING and USE (continued)

and direct sunlight. Protect cylinders against physical damage. Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Consider installation of leak detection and alarm for storage and use areas. Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers). Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. **WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.**

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (i.e. nitrogen) before attempting repairs. Always use product in areas where adequate ventilation is provided.

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. Employee exposure should be monitored and reduced to the lowest practical levels using ventilation or other, appropriate, engineering controls.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if the level of Nitrogen Dioxide exceeds exposure limits presented in Section 2 (Composition and Information of Ingredients) and oxygen levels are below 19.5% or unknown 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. 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). Respiratory selection guidelines from NIOSH for Nitrogen Dioxide are provided below for information.

NIOSH/OSHA RECOMMENDATIONS FOR NITROGEN DIOXIDE CONCENTRATIONS IN AIR:

Up to 20 ppm Supplied Air Respirator (SAR) operated in a continuous-flow mode; or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR.

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.

The IDLH concentration for Nitrogen Dioxide is 20 ppm.

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

HAND PROTECTION: No special protection is needed under normal circumstances of use. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: No special protection is needed under normal circumstances of use. 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.

9. PHYSICAL and CHEMICAL PROPERTIES

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

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ft³ (1.153 kg/m³)

FREEZING/MELTING POINT @ 10 psig: -210°C (-345.8°F)

SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906

SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023

EVAPORATION RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD: Not applicable.

VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

BOILING POINT: -195.8°C (-320.4°F)

pH: Not applicable.

MOLECULAR WEIGHT: 28.01

EXPANSION RATIO: Not applicable.

SPECIFIC VOLUME (ft³/lb): 13.8

The following information is for the gas mixture.

APPEARANCE, ODOR AND COLOR: This gas mixture is a colorless, to red-brown, oxidizing gas which is either odorless or has an acrid odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The color or odor may be warning properties associated with 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.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: Nitrogen Dioxide decomposes in water to form nitric and nitrous acids. Above 160°C (320°F), Nitrogen Dioxide decomposes to nitric oxide and oxygen. The 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 (a component of this gas mixture). Lithium reacts slowly with Nitrogen at ambient temperatures. The Nitrogen Dioxide and Oxygen components of this gas mixture are incompatible with combustible and flammable materials. Nitrogen Dioxide is incompatible with many powdered metals.

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: The following toxicology data are available for the components of this gas mixture:

NITROGEN:

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

NITROGEN DIOXIDE:

Mutation in Microorganism System (Salmonella typhimurium) 6 ppm

Sister Chromatid Exchange (hamster lung) 5 ppm for 10 months

TDLo (inhalation, mouse) 22 ppm, Reproductive effects

NITROGEN DIOXIDE (continued):

TCLo (inhalation, rat) 0.85 mg/m³, Teratogenic effects

LCLo (inhalation, human) 200 ppm for 1 month

TCLo (inhalation, man) 6.2 ppm for 10 months, pulmonary effects

TCLo (inhalation, 90 ppm for 40 minutes, pulmonary effects

LC⁵⁰ (inhalation, rat) 88 ppm for 4 hours

LC⁵⁰ (inhalation, mouse) 1000 ppm for 10 minutes

NITROGEN DIOXIDE (continued):

LCLo (inhalation, dog) 123 mg/m³

LCLo (inhalation, monkey) 123 mg/m³ for 8 hours

LC₅₀ (inhalation, rabbit) 315 ppm for 15 minutes

LC₅₀ (inhalation, guinea pig) 30 ppm for 1 hour

OXYGEN:

The toxicological data for Oxygen are related to exposures at high concentrations and elevated pressures (and are not pertinent to the type of exposures associated with this gas mixture).

SUSPECTED CANCER AGENT: The components of this gas mixture are listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

NITROGEN DIOXIDE: ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen); IARC-3 (Unclassifiable as to Carcinogenicity in Humans)

The remaining component, Nitrogen, is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Due to the presence of Nitrogen Dioxide, this gas mixture can be irritating to the skin and eyes.

SENSITIZATION TO THE PRODUCT: The components of this gas mixture are not known to cause skin or respiratory sensitization in humans.

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

Mutagenicity: No mutagenicity effects in humans have been described for the components of this gas mixture. The Nitrogen Dioxide component of this gas mixture has been shown to cause genetic damage in bacterial studies.

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

Teratogenicity: No human teratogenic effects have been described for the components of this gas mixture. The Nitrogen Dioxide component of this gas mixture has been shown to cause and fetal toxicity in animal studies.

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

A *mutagen* 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 STABILITY: The gas will be dissipated rapidly in well-ventilated areas. Complex reactions of Nitrogen Dioxide occur in the atmosphere which contribute to air pollution. The following environmental data are applicable to the components of this gas mixture.

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

OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log K_{ow} = -0.65

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Adverse effects on animals would be related to respiratory system damage, and damage to the skin and eyes, due to the presence of Nitrogen Dioxide. Because Nitrogen Dioxide produces corrosive nitric acid, upon contact with air or moisture, plants may be damaged or destroyed.

EFFECT OF CHEMICAL ON AQUATIC LIFE: The Nitrogen Dioxide component of this gas mixture hydrolyzes to nitrogen dioxide when in contact with water. In the unlikely event that a release of this gas mixture occurs near a river or other body of water, fish and other aquatic life may be harmed.

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.

PROPER SHIPPING 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, 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 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 is considered as Dangerous Goods, per regulations of Transport Canada.

PROPER SHIPPING 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

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

PASSENGER CARRYING ROAD VEHICLE OR PASSENGER CARRYING RAILWAY VEHICLE INDEX: 75

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 121

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: The components of this gas mixture are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Nitrogen Dioxide	YES	YES	NO

U.S. SARA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE THRESHOLD PLANNING QUANTITY: Nitrogen Dioxide = 100 lb (45. kg).

U.S. SARA SECTION 304 EXTREMELY HAZARDOUS SUBSTANCE REPORTABLE QUANTITY: Sulfur Dioxide = 100 lb (45.4 kg)

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

U.S. CERCLA REPORTABLE QUANTITY (RQ): Nitrogen Dioxide = 10 lb (4.45 kg).

OTHER U.S. FEDERAL REGULATIONS:

- Nitrogen Dioxide is subject to the requirements of CFR 29 1910.1000. Nitrogen Dioxide is listed on Table Z.1.
- 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). Under this regulation Nitrogen Dioxide is listed in Appendix A. The threshold quantity for Nitrogen Dioxide under this regulation is 250 lb (113.5 kg); therefore, a single cylinder of this gas mixture would not be subject to this regulation.
- Nitrogen Dioxide, Anhydrous is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The reportable quantity under this regulations is 10,000 lb (4554 kg).
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Nitrogen Dioxide, Nitrogen and Oxygen are not listed as Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases.

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

Alaska - Designated Toxic and Hazardous Substances: Nitrogen Dioxide.

California - Permissible Exposure Limits for Chemical Contaminants: Nitrogen Dioxide, Nitrogen.

Florida - Substance List: Oxygen, Nitrogen Dioxide, Nitrogen.

Illinois - Toxic Substance List: Nitrogen Dioxide.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List: Oxygen, Nitrogen Dioxide, Nitrogen.

Michigan - Critical Materials Register: No.

Minnesota - List of Hazardous Substances: Nitrogen Dioxide.

Missouri - Employer Information/Toxic Substance List: Nitrogen Dioxide.

New Jersey - Right to Know Hazardous Substance List: Oxygen, Nitrogen Dioxide, Nitrogen.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: Nitrogen Dioxide.

Pennsylvania - Hazardous Substance List: Oxygen, Nitrogen Dioxide, Nitrogen.

Rhode Island - Hazardous Substance List: Oxygen, Nitrogen Dioxide.

Texas - Hazardous Substance List: Nitrogen Dioxide, Nitrogen.

West Virginia - Hazardous Substance List: Nitrogen Dioxide.

Wisconsin - Toxic and Hazardous Substances List: Nitrogen Dioxide.

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

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL 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 List.

CANADIAN WHMIS INFORMATION: This gas mixture is categorized as a Controlled Product, Hazard Classes A, D2B, and C, 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 are flammable or oxidizing gas 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 employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. CALGAZ will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping 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 of 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 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.