

## MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian Worksafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations

# PORTAGAS

### SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** NON-FLAMMABLE GAS MIXTURE Containing One or More of the Following Components in a Nitrogen Balance Gas: Oxygen, 0.0015-23.5%; Propane, 0-1.1%; n-Pentane, 0-0.75%; n-Hexane; 0-0.48%; Carbon Monoxide, 0.0005-1.0%; Hydrogen Sulfide, 0.001-0.025%

**SYNONYMS:** Not Applicable

**CHEMICAL FAMILY NAME:** Not Applicable

**FORMULA:** Not Applicable

**PRODUCT USE:** Calibration of Monitoring and Research Equipment

**DOCUMENT NUMBER:** MSDS 1011 (1810-0859,1810-2186,1810-2187,1810-2245,1810-2304,1810-2343,1810-2970,1810-3366,1810-3937,1810-4455,1810-4984,1810-5403,1810-6179,1810-6609,1810-6633,1810-7219,1810-7227,1810-7995,1810-8670,1810-9077,1810-9078,1810-9090,1810-9096,1810-9132,1810-9155,1810-9157,1810-9159,1810-9163,1810-9177,1810-9180,1810-9181,1810-9182,1810-9188,1810-9191,1810-9194,1810-9197)

**U.N. NUMBER:** UN1956

**U.N. DANGEROUS GOODS CLASS:** Compressed gases, n.o.s. (\*Oxygen, Nitrogen) \*or the gas component with the next highest concentration next to Nitrogen.

**SUPPLIER/MANUFACTURER'S NAME:** PortaGAS, Inc.

**ADDRESS:** 1202 E. Sam Houston Pkwy S., Pasadena, TX 77503

**BUSINESS PHONE:** +1 713 928 6477

**EMERGENCY PHONE:** International calls (outside USA): +1 813 248 0585  
Australian Poison Information Centre: 13 11 26  
Australian Fire Brigade: 000

**AUSTRALIAN IMPORTER:** Scientific Gas Australia Pty Ltd, 9 Wrights Rd, Drummoyne NSW 2047

**BUSINESS PHONE:** 1300 880 531

**DATE OF PREPARATION:** July 2013

**DATE OF LAST REVISION:** July 2013

### SECTION 2 - HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** This gas mixture is a colorless gas which has a rotten-egg odor (due to the presence of Hydrogen Sulfide). The odor cannot be relied on as an adequate warning of the presence of this gas mixture, because olfactory fatigue occurs after over-exposure to Hydrogen Sulfide. Hydrogen Sulfide and Carbon Monoxide (another component of this gas mixture) are toxic to humans in relatively low concentrations. Over-exposure to this gas mixture can cause skin or eye irritation, nausea, dizziness, headaches, collapse, unconsciousness, coma, and death. The Propane, n-Pentane, and n-Hexane components can cause anesthetic or peripheral neuropathy effects. Additionally, releases of this gas mixture may produce oxygen-deficient atmospheres (especially in small confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated.

US DOT SYMBOLS



CANADA (WHMIS) SYMBOLS



EUROPEAN and (GHS) HAZARD SYMBOLS



Signal Word: **Danger**

**EU LABELING AND CLASSIFICATION:**

**Classification of the substance or mixture according to Regulation (EC) No1272/2008**

Aspiration Hazard Category 1  
Pressurized Gas  
Acute Toxicity Inhalation Category 3

**According to European Directive 67/548/EEC as amended,**

Harmful by inhalation, pressurized gas

**Hazard Statement(s):**

H304: May be fatal if swallowed and enters airways.  
H270: May cause or intensify fire, oxidizer.  
H280: Contains gas under pressure, may explode if heated.  
H331: Toxic if inhaled.

**Precautionary Statement(s):**

P261: Avoid breathing gas.  
P271: Use only in well ventilated area.  
P281: Use personal protective equipment as required.  
P314: Get medical advice/attention if you feel unwell.  
P403: Store in a well ventilated place.

**Hazard Symbol(s):**

[Xn] Harmful, [O] Oxidizer

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## Risk Phrases: Simple Asphyxiant

R8: Contact with combustible material may cause fire.  
 R48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.  
 R65: Harmful may cause lung damage if swallowed.  
 R67: Vapors may cause drowsiness and dizziness.

## Safety Phrases:

S9: Keep container in a well ventilated area.  
 S23: Do not breathe gas.  
 S36/37: Wear suitable protective clothing and gloves.

## HEALTH HAZARDS OR RISKS FROM EXPOSURE:

**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. However, the Hydrogen Sulfide and Carbon Monoxide components of this gas mixture are toxic to humans. Over-exposure to this gas mixture can cause nausea, dizziness, headaches, collapse, unconsciousness, coma, and death. Due to the presence of Hydrogen Sulfide, over-exposures to this gas mixture can also irritate the skin and eyes; severe eye contamination can result in blindness. Inhalation over-exposures to Propane, n-Pentane, and n-Hexane can cause anesthetic effects and motor neuropathy (i.e. pain and tingling in feet and hands).

**CHRONIC:** Abnormal color perception and pigment changes in the eyes have been reported among persons exposed to 420 -1300 ppm of n-Hexane for five years. Additionally, long-term exposure to low levels of n-Hexane or n-Pentane can affect the nerves in the arms and legs. Effects include numbing or tingling sensation, tiredness, cramps, spasms in legs, difficulty holding objects or walking, loss of appetite and weight loss. Pentane isomers, such as n-Pentane, and Propane can cause sensitization of the heart to epinephrine. Refer to Section 11 (Toxicology Information) for additional information on the components of this gas mixture.

## TARGET ORGANS:

ACUTE: Respiratory system, blood system, central nervous system, cardiovascular system.  
 CHRONIC: Reproductive system, cardiovascular system.

## SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS#	ICSC #	% Vol	HAZARD CLASSIFICATION; RISK PHRASES
n-Hexane	110-54-3	203-777-6	0279	0 – 0.48%	HAZARD CLASSIFICATION:[Xn] HARMFUL RISK PHRASES: R48/20
n-Pentane	109-66-0	203-692-4	0534	0 – 0.75%	HAZARD CLASSIFICATION:[Xn] HARMFUL RISK PHRASES: R65, R67
Carbon Monoxide	630-08-0	211-128-3	0023	0.0005 – 1.0%	HAZARD CLASSIFICATION:[T] Toxic RISK PHRASES: R23, R48/23
Propane	74-98-6	200-827-9	0319	0 – 1.1%	HAZARD CLASSIFICATION:[F] FLAMMABLE RISK PHRASES: R12
Hydrogen Sulfide	7783-06-4	231-977-3	0165	0.001 – 0.025%	HAZARD CLASSIFICATION:[T] Toxic RISK PHRASES: R26
Oxygen	7782-44-7	231-956-9	0138	0.0015-23.5%	HAZARD CLASSIFICATION:[O] OXIDIZER RISK PHRASES: R8
Nitrogen	7727-37-9	231-783-9	1198	Balance	HAZARD CLASSIFICATION:[Xi] IRRITANT RISK PHRASES: R36/38

None of the trace impurities in this product contribute significantly to the hazards associated with the product.  
 All hazard information pertinent to the product has been provided in this Material Safety Data sheet., per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards

**Note:** ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 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, EU Directives and the Japanese Industrial Standard JIS Z 7250: 2000.

## SECTION 4 - FIRST-AID MEASURES

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

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

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

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

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate over-exposure. Hyperbaric oxygen is the most efficient antidote to Carbon Monoxide poisoning, the optimum range being 2-2.5 atm. A special mask, or, preferably, a compression chamber to utilize oxygen at these pressures is required. Avoid administering stimulant drugs. Be observant for initial signs of pulmonary edema in the event of severe inhalation over-exposures.

## SECTION 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 mixture. Use extinguishing media appropriate for surrounding fire.

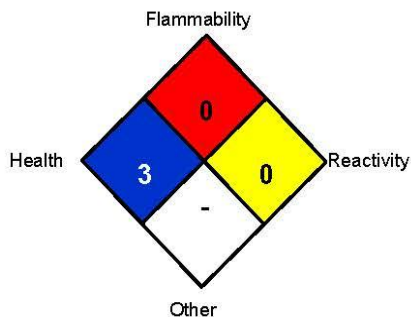
**UNUSUAL FIRE AND EXPLOSION HAZARDS:** This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to 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.

### NFPA RATING SYSTEM



### HMIS RATING SYSTEM

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

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe \* = Chronic hazard

## SECTION 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 of over-exposure to Hydrogen Sulfide and Carbon Monoxide, the toxic components of this gas mixture, and other safety hazards related to the remaining components of this gas mixture, 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. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel. For emergency disposal, secure the cylinder and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors. Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Hydrogen Sulfide, Carbon Monoxide, and Oxygen. Hydrogen Sulfide and Carbon Monoxide level must be below exposure level listed 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.

## SECTION 7 - HANDLING and STORAGE

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



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**STORAGE AND HANDLING PRACTICES:** 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, and direct sunlight. Protect cylinders against physical damage. 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 that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

## SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

**EXPOSURE LIMITS/GUIDELINES:**

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
n-Hexane	110-54-3	50 ppm (Skin)	500 ppm	20 ppm
n-Pentane	109-66-0	600 ppm	1000 ppm	600 ppm
Carbon Monoxide	630-08-0	25 ppm	50 ppm	30 ppm
Propane	74-98-6	2500 ppm	1000 ppm	Not Listed
Hydrogen Sulfide	7783-06-4	10 ppm	10 ppm	10 ppm
Oxygen	7782-44-7	Not Listed	Not Listed	Not Listed
Nitrogen	7727-37-9	Not Listed	Not Listed	Not Listed

There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%

**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. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of Oxygen, Hydrogen Sulfide, and Carbon Monoxide.

**RESPIRATORY PROTECTION:** No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if Carbon Monoxide levels exceed the exposure levels given in Section 2 (Composition and Information on Ingredients) or if oxygen levels are below 19.5%, or if either level is unknown during emergency response to a release of this gas mixture. If respiratory protection is required for emergency response to this gas mixture, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

**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.

## SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

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

<b>GAS DENSITY@32°F (0°C) and 1 atm:</b>	0.072 lbs/cu ft (1.153 kg/m <sup>3</sup> )
<b>BOILING POINT:</b>	-195.8°C (-320.4°F)
<b>FREEZING/MELTING POINT (@ 10 psig):</b>	-210°C (345.8°F)
<b>SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C):</b>	0.906
<b>pH:</b>	Not applicable.
<b>SOLUBILITY IN WATER vol/vol at 32°F (0°C) and 1 atm:</b>	0.023
<b>MOLECULAR WEIGHT:</b>	28.01
<b>EVAPORATION RATE (nBuAc = 1):</b>	Not applicable.
<b>EXPANSION RATIO:</b>	Not applicable.
<b>ODOR THRESHOLD:</b>	Not applicable. Odorless.
<b>SPECIFIC VOLUME (ft<sup>3</sup>/lb):</b>	13.8
<b>VAPOR PRESSURE @ 70°F (21.1°C) (psig):</b>	Not applicable.
<b>COEFFICIENT WATER/OIL DISTRIBUTION:</b>	Not applicable.
<b>APPEARANCE, ODOR AND COLOR:</b>	This product is a colorless gas with a rotten-egg like odor.
<b>HOW TO DETECT THIS SUBSTANCE (warning properties):</b>	There are no unusual warning properties associated with a release of this product.

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## SECTION 10 - STABILITY and REACTIVITY

**STABILITY:** Normally stable in gaseous state.

**DECOMPOSITION PRODUCTS:** The thermal decomposition products of Propane, n-Hexane, and n-Pentane include carbon oxides.

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

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Titanium will burn in Nitrogen (the main component of this gas mixture). Lithium reacts slowly with Nitrogen at ambient temperatures. Components of this gas mixture (Hydrogen Sulfide, Propane, n-Pentane, n-Hexane) are also incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride). Carbon Monoxide is mildly corrosive to nickel and iron (especially at high temperatures and pressures). Hydrogen Sulfide is corrosive to most metals, because it reacts with these substances to form metal sulfides.

**HAZARDOUS POLYMERIZATION:** Will not occur.

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

## SECTION 11 - TOXICOLOGICAL INFORMATION

**TOXICITY DATA:** The following toxicology data are available for the components of this gas mixture in 1% concentration or greater:

**CARBON MONOXIDE:** TCLo (inhalation, mouse) = 65 ppm/24 hours (7-18 preg): rep. effects TCLo (inhalation, mouse) = 8 pph/1 hour (female 8D post): ter. effects TCLo (inhalation, human) = 600 mg/m /10 minutes LCLo (inhalation, man) = 4000 ppm/30 minutes TCLo (inhalation, man) = 650 ppm/45 minutes: central nervous system and blood system effects.

**n-PENTANE:** LD<sub>50</sub> (intravenous, mouse) = 446 mg/kg. LC<sub>50</sub> (inhalation, rat) = 364 g/m /4 hours LCLo (inhalation, mouse) = 325 g/m /2 hours

**n-HEXANE:** Eye, rabbit = 10 mg/ mild TCLo (inhalation, rat) = 10,000 ppm/7 hr. TCLo (inhalation, rat) = 5000 ppm/20 hours; teratogenic effects LD50 (oral, rat) = 28710 mg/kg LDLo (intraperitoneal, rat) = 9100 mg/kg LCLo (inhalation, mouse) = 120,000 mg/kg LD50 (rat, oral): 28,710 mg/kg ACUTE INHALATION (mouse): 30,000 ppm, narcosis within 30 to 60 minutes; 35,000-40,000 ppm, convulsions and death. DERMAL (rabbit): 2 to 5 ml/kg for 4 hours resulted in restlessness and discoordination; death occurred at 5 ml/kg.

**HYDROGEN SULFIDE:** LCLo (inhalation, human) = 600 ppm/30 minutes LDLo (inhalation, man) = 5.7 mg/kg; central nervous system, pulmonary effects LCLo (inhalation, human) = 800 ppm/5 minutes LC<sub>50</sub> (inhalation, rat) = 444 ppm LC<sub>50</sub> (inhalation, mouse) = 673 ppm/1 hour LCLo (inhalation, mammal) = 800 ppm/5 minutes

**PROPANE: Skin Contact (Rabbit):** Several formulations containing an isobutane-propane mixture have been tested for skin irritation effects. All formulations contained less than 13% propane. All of the formulations containing propane caused only mild irritation.

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

**OXYGEN:** The toxicity data for Oxygen are related to exposures in a hyperbaric environment and are not likely to occur in industrial exposure situations.

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

**IRRITANCY OF PRODUCT:** The Hydrogen Sulfide component of this gas mixture, is irritating to the eyes, and may be irritating to the skin.

**SENSITIZATION OF PRODUCT:** The components of this gas mixture are not known to be skin or respiratory sensitizers. Pentane isomers (i.e. n-Pentane) can cause cardiac sensitization to epinephrine.

**REPRODUCTIVE TOXICITY INFORMATION:** Listed below is information concerning the effects of this gas mixture on the human reproductive system. Mutagenicity: No mutagenicity effects have been described for the components of this gas mixture. Embryotoxicity: This gas mixture contains components that may cause embryotoxic effects in humans; however, due to the small total amount of the components, embryotoxic effects are not expected to occur. Teratogenicity: This gas mixture is not expected to cause teratogenic effects in humans due to the small cylinder size and small total amount of all components. The Carbon Monoxide component of this gas mixture which exists up to 1%, can cause teratogenic effects in humans. Severe exposure to Carbon Monoxide during pregnancy has caused adverse effects and the death of the fetus. In general, maternal symptoms are an indicator of the potential risk to the fetus since Carbon Monoxide is toxic to the mother before it is toxic to the fetus. Reproductive Toxicity: The components of this gas mixture are not expected to cause adverse reproductive effects in humans.

**BIOLOGICAL EXPOSURE INDICES (BEIs):** Biological Exposure Indices (BEIs) have been determined for the Carbon Monoxide and Hexane components, as follows:

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CHEMICAL DETERMINANT	SAMPLING TIME	BEI
<b>CARBON MONOXIDE</b> <ul style="list-style-type: none"> <li>Carboxyhemoglobin in blood</li> <li>Carbon monoxide in end-exhaled air</li> </ul>	<ul style="list-style-type: none"> <li>End of shift</li> <li>End of shift</li> </ul>	<ul style="list-style-type: none"> <li>3.5% hemoglobin</li> <li>20 ppm</li> </ul>
<b>n-HEXANE</b> <ul style="list-style-type: none"> <li>n-Hexane in end-exhaled air</li> </ul> Notice of inended Change: <ul style="list-style-type: none"> <li>2,5-Hexanedione in urine</li> </ul>	<ul style="list-style-type: none"> <li>End of shift</li> <li>End of shift at end of workweek (currently is "Endo of Shift")</li> </ul>	<ul style="list-style-type: none"> <li>5 mg/g creatinine</li> <li>0.4 mg/L</li> </ul>

## SECTION 12 - ECOLOGICAL INFORMATION

**ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.**

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

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

**PENTANE:** Log  $K_{ow}$  = 3.39. Water Solubility = 38.5 mg/L. LOG BCF (n-pentane)  $_{ow}$  = calculated, 1.90 and 2.35, respectively.

Photolysis, hydrolysis, and bioconcentration are not anticipated to be important fate processes. Biodegradation and soil adsorption are anticipated to be more important processes for this compound.

**n-HEXANE:** Log  $K_{ow}$  = 3.90-4.11. Water Solubility = 9.5 mg/L. Estimated Bioconcentration Factor = 2.24 and 2.89. Bioconcentration in aquatic organisms is low. Hexane is volatile. Rapid volatilization from water and soil is anticipated for this compound. Hexane will float in slick on surface of the water.

**HYDROGEN SULFIDE:** Water Solubility = 1 g/242 mL at 20°C.

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

**EFFECT OF MATERIAL ON PLANTS OR ANIMALS:** No evidence is currently available on this gas mixture's effects on plant and animal life. The Hydrogen Sulfide and Carbon Monoxide components of this gas mixture can be deadly to exposed animal life, producing symptoms similar to those experienced by humans. This gas mixture may also be harmful to plant life.

**EFFECT OF CHEMICAL ON AQUATIC LIFE:** No evidence is currently available on the effects of this gas effects on aquatic life. The presence of more than a trace of Carbon Monoxide is a hazard to fish. The following aquatic toxicity data are available for the Hydrogen Sulfide component of this gas mixture. TLm (Asellussp) = 0.111 mg/L/96 hour TLm (Cranfngonyx sp) = 1.07 mg/L/96 hour TLm (Gammarrus) = 0.84 mg/L/96 hour LC<sub>50</sub> (fly inhalation) = 380 mg/m /960 minutes LC<sub>50</sub> (fly inhalation) = 1500 mg/m /7 minutes TLm (Lepomis macrochirus, bluegill sunfish) = 0.0478 mg/L/96 hour TLm (Lepomis macrochirus, bluegill sunfish) = 0.0448 mg/L/96 hour at 21-22 °C TLm (Pimephlaes promelas, fathead minnow) = 0.0071-0.55 mg/L/96 hour TLm (Salvenilis foninalis, brook trout) = 0.0216-0.038 mg/L/96 hour at 8-12.5 °C

## SECTION 13 - DISPOSAL CONSIDERATIONS

**PREPARING WASTES FOR DISPOSAL:** Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

## SECTION 14 - TRANSPORTATION INFORMATION

**US DOT: IATA: IMO: ADR:**

**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:** Class 2.2 (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.

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## U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:

This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

## TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:

This product is classified 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 (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).

## INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):

This product is classified as Dangerous Goods, by rules of IATA.

## INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:

This product is classified as Dangerous Goods by the International Maritime Organization.

## EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This product is classified by the United Nations Economic Commission for Europe to be dangerous goods.

## SECTION 15 - REGULATORY INFORMATION

### UNITED STATES REGULATIONS

**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)
n-Hexane	NO	YES	YES
Hydrogen Sulfide	YES	YES	YES

**TSCA:** All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

### SARA 311/312:

Acute Health: No      Chronic Health: No      Fire: No      Reactivity: No

**U.S. SARA THRESHOLD PLANNING QUANTITY:** There are no specific Threshold Planning Quantities for this gas. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

**U.S. CERCLA REPORTABLE QUANTITY (RQ):** Hexane = 5000 lb (2270 kg); Hydrogen Sulfide = 100 lbs (45.4 lb)

**OTHER U.S. FEDERAL REGULATIONS:** Hydrogen Sulfide, Carbon Monoxide, Propane, n-Pentane and n-Hexane are subject to the reporting requirements of CFR 29 1910.1000. Hydrogen Sulfide, Propane and n-Pentane are subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for each of these gases is 10,000 pounds and so this mixture will not be affected by the regulation. Depending on specific operations involving the use of this gas mixture, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Hydrogen Sulfide is listed in Appendix A of this regulation. The Threshold Quantity for Hydrogen Sulfide under this regulation is 1500 lbs. This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82). Nitrogen, Oxygen and n-Hexane are not listed Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Hydrogen Sulfide is listed under this regulation in Table 1 as a Regulated Substance (Toxic Substance), in quantities of 10,000 lbs (4,553 kg) or greater. Carbon Monoxide, Propane and n-Pentane are listed under this regulation in Table 3, as Regulated Substances (Flammable), in quantities of 10,000 lbs (4,553 kg) or greater, and so this mixture will not be affected by the regulation.

# MATERIAL SAFETY DATA SHEET

## 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:	Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
California - Permissible Exposure Limits for Chemical Contaminants:	Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Florida - Substance List:	Oxygen, Carbon Monoxide, n-Pentane, n-Hexane, Hydrogen Sulfide.
Illinois - Toxic Substance List:	Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Kansas - Section 302/313 List:	No.
Massachusetts - Substance List:	Oxygen, Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Michigan - Critical Materials Register:	No.
Minnesota - List of Hazardous Substances:	Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Missouri - Employer Information/Toxic Substance List:	n-Pentane, n-Hexane, Propane, Hydrogen Sulfide.
New Jersey - Right to Know Hazardous Substance List:	Oxygen, Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane.
North Dakota - List of Hazardous Chemicals, Reportable Quantities:	Hydrogen Sulfide.
Pennsylvania - Hazardous Substance List:	Oxygen, Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Rhode Island - Hazardous Substance List:	Oxygen, Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Texas - Hazardous Substance List:	n-Pentane, n-Hexane, Propane, Hydrogen Sulfide
West Virginia - Hazardous Substance List:	n-Pentane, n-Hexane, Propane, Hydrogen Sulfide
Wisconsin - Toxic and Hazardous Substances:	n-Pentane, n-Hexane, Propane, Hydrogen Sulfide

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):** This product does not contain any component above the 0.1% level which is listed as a California Proposition 65 chemical.

## CANADIAN REGULATIONS:

**CANADIAN DSL/NDL INVENTORY STATUS:** All of the components of this product are on the DSL Inventory

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** The components of this gas mixture are not on the CEPA Priorities Substances Lists.

**CANADIAN WHMIS CLASSIFICATION and SYMBOLS:** This gas mixture is categorized as a Controlled Product, Hazard Classes A – Compressed Gases and D2B – Toxic Material, as per the Controlled Product Regulations.

## EUROPEAN ECONOMIC COMMUNITY INFORMATION:

**EU LABELING AND CLASSIFICATION:** Classification of the substance or mixture according to Regulation (EC) No1272/2008. See section 2 for details.

## AUSTRALIAN INFORMATION FOR PRODUCT:

**AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS:** All components of this product are listed on the AICS.

**STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS:** Not applicable.

## JAPANESE INFORMATION FOR PRODUCT:

**JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS:** The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

## INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed



# MATERIAL SAFETY DATA SHEET

## SECTION 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 mixture 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.

**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.

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