PORTAGAS

Material Safety Data Sheet

1. Product Identification

CHEMICAL NAME; CLASS: Non-flammable Gas Mixture Containing Carbon Monoxide (< 12.5%) and Air (Balance)
CHEMICAL FAMILY NAME: N/A
FORMULA: N/A
MSDS Number: 161021
PRODUCT USE: For general analytical/synthetic chemical uses.
SUPPLIER/MANUFACTURER'S NAME: Portagas
ADDRESS: 6717-B Polk Street
Houston, TX 77011
BUSINESS PHONE: General MSDS Info: (713) 928-6477
EMERGENCY PHONE: INFOTRAC :(800) 535-5053

2. Composition and Information on Ingredients

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	OTHER
Carbon Monoxide	630-08-0	< 12.5%	25	NE	50 35 (Vacated 1989 PEL)	200 C (Vacated 1989 PEL)	1200	NIOSH REL: 35 ppm (TWA); 200 ppm C DFG MAK: 30 ppm
Air (compressed, atmospheric)	132259-10-0	Balance	There are no specific exposure limits applicable to air.					
Air is a mixture of gases. The primary components of air, and the approximate concentration of each component, are listed below.								
Oxygen	7782-44-7	21%	There are no specific exposure limits for Oxygen.					
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

3. Hazard Identification

EMERGENCY OVERVIEW: This gas mixture is a colorless, odorless, non-flammable gas. This gas mixture can cause nausea, dizziness, and headaches, due to the presence of Carbon Monoxide. Severe inhalation exposures may be fatal. 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 Carbon Monoxide is by inhalation. INHALATION: Carbon monoxide is classified as a chemical asphyxiate, producing a toxic action by combining with the hemoglobin of the blood and replacing the

available oxygen. Through this replacement, the body is deprived of the required oxygen, and asphyxiation occurs. Since the affinity of carbon monoxide for hemoglobin is about200-300 times that of oxygen, only a small amount of Carbon Monoxide will cause a toxic reaction to occur. Carbon Monoxide exposures in excess of 50 ppm will produce symptoms of poisoning if breathed for a sufficiently long time. Other effects of exposure can be summarized as follows:

CONCENTRATION OF GAS	**OBSERVED EFFECT**
All exposure levels:	Over-exposure to Carbon Monoxide can be indicated by the lips and fingernails turning bright red.
200 ppm:	Slight symptoms (headache, discomfort) after several hours of exposure.
400 ppm:	Headache and discomfort experienced within 2-3 hours of exposure.
1,000 -2000 ppm:	Within 30 minutes, slight palpitations of the heart occur. Within 1.5 hours, there is a tendency to stagger. Within 2 hours, there is mental confusion, headache, and nausea.
2000-2500 ppm:	Unconsciousness within 30 minutes.
>2500 ppm:	Potential for collapse and death before warning symptoms are produced.

NOTE: At high altitudes, individuals may be more susceptible to Carbon Monoxide over-exposures. Development of symptoms may also occur more rapidly if individuals are doing physically demanding tasks. Individuals who have heart conditions may experience a more rapid onset of symptoms. During recovery, victims can experience headaches, vision problems, and memory loss.

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

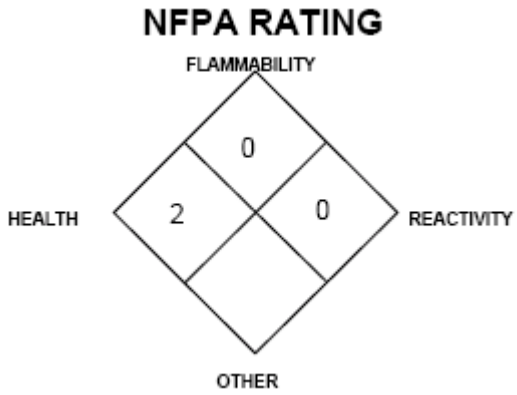
ACUTE: Carbon Monoxide is a toxic gas. Symptoms of Carbon Monoxide poisoning can develop gradually, or can arise suddenly, depending on the concentration and duration of exposure. Lips and fingernails will turn bright red,

which is a significant sign of Carbon Monoxide over-exposure. Other symptoms of over-exposure can include headache, shortness of breath, wheezing, dizziness, indigestion, and nausea. At high concentrations unconsciousness or death may occur. Symptoms can include blurred vision and memory loss.
CHRONIC: Clinical studies indicate that there is a relationship between exposure to Carbon Monoxide in specific occupations (i.e., fire-fighters, foundry workers) and an increased incidence of cardiovascular problems. Carbon Monoxide is a reproductive toxin. Refer to Section 11 of this MSDS for further information.
TARGET ORGANS: Respiratory system, circulatory system, cardiovascular system, and reproductive system.

4. First Aid Measures

INHALATION: Immediately remove victim to fresh air. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary.

5. Fire-Fighting Measures



FLASH POINT: Not applicable. Non-Flammable gas.
AUTOIGNITION TEMPERATURE: Not Applicable
FLAMMABLE LIMITS (in air by volume, %):
Lower (LEL): Not Applicable
Upper (UEL): Not Applicable
FIRE EXTINGUISHING MATERIALS: Extinguish fires of this gas by shutting off the source of the gas. Keep fire exposed cylinders cool with water spray.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Do not expose to heat or flame.

6. Accidental Release Measures

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, gloves and Self-Contained**

Breathing Apparatus. Locate and seal the source of the leaking gas. Protect personnel attempting the shut off with water-spray. Allow the gas to dissipate.

7. Handling And Use

WORK PRACTICES AND HYGIENE PRACTICES: Do not attempt to repair, adjust, or in any other way modify the cylinders containing Carbon Monoxide. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE AND HANDLING PRACTICES: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Store in well ventilated areas. Keep valve protection caps on cylinders when not in use. Store away from heat, flame, and sparks. Do not allow area where cylinders are stored to exceed 52° C (125° F). Cylinders should be separated from oxygen cylinders or other oxidizers by a minimum distance of 20 ft. or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least 0.5 hours.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper connections; DO NOT USE ADAPTERS.
THREADED**:** 0-3000 PSIG - CGA 350
PIN-INDEXED YOKE: Not Applicable.
ULTRA HIGH INTEGRITY: 724

8. Exposure Controls – Personal Protection

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to avoid asphyxiation.
EYE / FACE PROTECTION: Safety glasses
RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.
OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. Physical and Chemical Properties

GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.72 lb/ft3
BOILING POINT @ 1 atm: -195.8°C (-320.4°F)
FREEZING/MELTING POINT @ 1 atm: -210°C (-345.8°F)
SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F) and 1 atm: 0.906
pH: Not applicable.
SOLUBILITY IN WATER vol/vol @ 0°C (32°F): 0.023
MOLECULAR WEIGHT: 28.01

EVAPORATION RATE (nBuAc = 1): Not applicable.
EXPANSION RATIO: Not applicable.
ODOR THRESHOLD: Not applicable.
SPECIFIC VOLUME (cu. ft/lb): 13.8
VAPOR PRESSURE @21.1°C (70°F) psig: Not Applicable.
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.
APPEARANCE AND COLOR: Colorless, odorless gas.

10. Stability and Reactivity

STABILITY: Stable under normal storage conditions.
CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.
MATERIALS TO AVOID: Nitrogen reacts with Li, Nd, and Ti at high temperatures.
HAZARDOUS POLYMERIZATION: Will not occur.
HAZARDOUS DECOMPOSITION: None

11. Toxicological Information

TOXICITY DATA: The following toxicity data are available for Carbon Monoxide:
TCLo (inhalation, mouse) = 65 ppm/24 hours (7-18 preg): reproductive effects
TCLo (inhalation, mouse) = 8 pph/1 hour (female 8D post): teratogenic effects
TCLo (inhalation, human) = 600 mg/m3/10 minutes
LCLo (inhalation, man) = 4000 ppm/30 minutes
TCLo (inhalation, man) = 650 ppm/45 minutes: central nervous system and blood system effects.
LCLo (inhalation, human) = 5000 ppm/5 minutes
LCLo (inhalation, dog) = 4000 ppm/46 minutes
LCLo (inhalation, rabbit) = 4000 ppm
LC50 (inhalation, guinea pig) = 5718 ppm/4 hours
LCLo (inhalation, mammal) = 5000 ppm/5 minutes
LD50 (inhalation, wild bird) = 1334 ppm

BIOLOGICAL EXPOSURE INDICES (BEIs): Biological Exposure Indices (BEIs) are applicable for Carbon Monoxide, as follows:

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
CARBON MONOXIDE • Carboxyhemoglobin in blood • Carbon monoxide in end-exhaled air	 • End of shift • End of shift	 • 3.5% of hemoglobin • 20 ppm

12. Ecological Information

ENVIRONMENTAL STABILITY: Carbon Monoxide occurs naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: Carbon Monoxide can be deadly to exposed animal life, producing symptoms similar to those experienced by humans. This gas may also be harmful to plant life.
EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available regarding Carbon Monoxide's effects on aquatic life.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. Transportation Information

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Compressed gases, n.o.s. (Carbon Monoxide, Air)
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 (1996): 126
SPECIAL PROVISION: Carbon Monoxide is poisonous by inhalation. Shipments must be properly described as inhalation hazards. ZONE D.
MARINE POLLUTANT: Carbon Monoxide is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

15. Regulatory Information

U.S. SARA REPORTING REQUIREMENTS: This gas mixture is not 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: Not applicable.
U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.
CANADIAN DSL INVENTORY STATUS: Carbon Monoxide is listed on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Carbon Monoxide is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS:

• Carbon Monoxide is subject to the requirements of CFR 29 1910.1000. Carbon Monoxide is listed on Table Z.1.

• Carbon Monoxide does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).

• Depending on specific operations involving the use of Carbon Monoxide, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Carbon Monoxide is not listed in Appendix A of this regulation, however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lbs (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

• Carbon Monoxide is listed under Table 3 as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Releases as a flammable substance.

OTHER CANADIAN REGULATIONS: Carbon Monoxide is categorized as a Controlled Product, Hazard Classes A, B1, D1A, and D2A as per the Controlled Product Regulations.

U.S. STATE REGULATORY INFORMATION: Carbon Monoxide is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Carbon Monoxide.
California - Permissible Exposure Limits for Chemical Contaminants: Carbon Monoxide.
Florida - Substance List: Carbon Monoxide.
Illinois - Toxic Substance List: Carbon Monoxide.
Kansas - Section 302/313 List: None.
Michigan - Critical Materials Register: No.
Massachusetts - Substance List: Carbon Monoxide.
Minnesota - List of Hazardous Substances: Carbon Monoxide.
Missouri - Employer Information/Toxic Substance List: Carbon Monoxide.
New Jersey - Right to Know Hazardous Substance List: Carbon Monoxide.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Carbon Monoxide.
Rhode Island - Hazardous Substance List: Carbon Monoxide.
Texas - Hazardous Substance List: No.
West Virginia - Hazardous Substance List: None.
Wisconsin - Toxic and Hazardous Substances: No.

CALIFORNIA PROPOSITION 65: Carbon Monoxide is on the California Proposition 65 lists. WARNING: Carbon Monoxide contains a chemical known to the State of California to cause birth defects or other reproductive harm.

16. Other Information

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Qualified producers of compressed gas should refill

cylinders. Shipment of a compressed gas cylinder, which has not been filled by the owner or with his written consent, is a violation of federal law (49 CFR).

Disclaimer: To the best of Portagas's 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 Carbon Monoxide 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.