



Emergency Contact: Chemtrec (800) 424-9300
Or Norco (208) 336-1643

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Boise, ID 83705
(208) 336-1643

Carbon Monoxide 1 PPM to 1000 PPM, Methane 0.0001% to 2.5%, Oxygen 2.0% to 23% in Nitrogen

MATERIAL SAFETY DATA SHEET

Identification

Product Name: Carbon Monoxide 1 to 1000 PPM, 0.0001% to 2.5% Methane, 2.0% to 23% Oxygen in Nitrogen

Chemical Name: Not Applicable

Chemical Family: Gas Mixture

CAS Number: N/A

Common Names/Synonyms: Calibration Gas, Bump gas, Cal Gas Mixture, Three Part Mix.

Revision Date: 03/05/02

MSDS Identification Code/Number: NL2280

Last Review Date: 08/18/11

Composition, Information on Ingredients

Exposure Limits¹:

Ingredient	% Volume	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Carbon Monoxide Formula: CO CAS Number: 0630-08-0 RTECS #: FG3500000	0.0001% to 0.1%	50 PPM TWA 25 PPM Canada	25 PPM TWA	LC ₅₀ : 3760 ppm Inhalation rat (1 hr-time adjusted, CGA P-20, 2003)
Methane Formula: CH ₄ CAS Number: 0074-82-8 RTECS#: TX2275000	0.0001% to 2.5%	None Established	1000 ppm	Not Available
Oxygen Formula: O ₂ CAS: 7782-44-7 RTECS#: RS206000	2.0% to 23%	None Established	None Established	Not Available
Nitrogen Formula: N ₂ CAS: 7727-37-9 RTECS#: QW9700000	74.4% to 97.9998%	None Established	Simple Asphyxiant	Not Available

¹ Refer to individual state or provincial regulations, as applicable, for limits that may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 2007 Threshold Limit Values for Chemical Substances and Physical Agents

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

IDLH (Carbon Monoxide): 1200 PPM

Hazard Identification

Emergency Overview:

Colorless, odorless non-flammable gas. Inhaled carbon monoxide binds to the blood hemoglobin, greatly reducing the red blood cell's ability to transport oxygen to body tissues. Effects may include headaches, dizziness, convulsions, loss of consciousness and death. Mix may or may not have sufficient oxygen content to support life; therefore mix should be treated as a simple asphyxiant. Maintain oxygen levels above 19.5%. Contents under pressure. Use and store below 125⁰F (52⁰ C).

Hazard Identification Continued
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Route of Entry:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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Health Effects:

Exposure Limits Yes	Irritant No	Sensitization No
Teratogen Yes	Reproductive Hazard Yes	Mutagen Yes
Synergistic Effects None reported		

Carcinogenicity: NTP: No IARC: No OSHA: No

Eye Effects:

Contact with product may cause minor irritation. Contact with rapidly expanding gas near the point of release may cause frostbite.

Skin Effects:

Contact with product may cause minor irritation. Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

Ingestion Effects:

None known. Ingestion is unlikely as product is a gas.

Inhalation Effects:

Acute effects are not anticipated unless high concentrations of gas are inhaled or prolonged or repeated exposures occur. This mixture contains small amounts of carbon monoxide, a substance which acts as a chemical asphyxiant. The affinity of hemoglobin for carbon monoxide is 200-300 times greater than its affinity for oxygen; thus hemoglobin will preferentially bind to carbon monoxide and asphyxiation can occur in the presence of atmospheric oxygen. Dependent on levels and duration of exposure, symptoms of overexposure may include all or none of the following: dizziness, tingling, headache, shortness of breath, emotional instability, defective memory, fatigue, nausea and vomiting, coma and death from respiratory arrest.

Lack of oxygen caused by overexposure to carbon monoxide may produce immediate as well as delayed neurological problems. Inhalation of carbon monoxide may also adversely affect fetal development.

Medical conditions Aggravated By Exposure:

Individuals with anemia, lung disease, cerebrovascular disease, heart disease, smokers, and children are expected to be more susceptible to the effects of carbon monoxide.

NFPA Hazard Codes

Health: 1
Flammability: 0
Reactivity: 0

HMIS Hazard Codes

Health: 1
Flammability: 0
Reactivity: 3

Ratings System

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, *CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition*.

First Aid Measures

Eyes:

If irritation occurs, flush eyes with lukewarm water for 15 minutes. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.

First Aid Measures Continued

Skin:

If irritation occurs, remove contaminated clothing and flush affected areas with lukewarm water. For frostbite, immerse skin in lukewarm water. DO NOT USE HOT WATER. Obtain medical attention.

Ingestion:

None required, product is a gas.

Inhalation:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO THIS PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and be treated with supplemental oxygen. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and be given artificial respiration and oxygen at the same time. The administering of the oxygen at an elevated pressure (up to 2 to 2.5 atmospheres) has shown to be beneficial as has treatment in a hyperbaric chamber. The physician should be informed that the patient has inhaled toxic quantities of carbon monoxide.

Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: Not Available
LEL (%): 12.5% (CO) 5.0% (CH ₄)	UEL (%) 74.0 % (CO) 15.0% (CH ₄)	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

Fire and Explosion Hazards:

Nonflammable. Product contains methane and carbon monoxide well below flammable limits. Cylinders may vent rapidly or rupture violently from pressure when involved in a fire situation.

Extinguishing Media:

None required. Use media appropriate for surrounding materials.

Fire Fighting Instructions:

Firefighters should wear a NIOSH/MSHA approved self-contained breathing apparatus operated in positive pressure mode and full turnout or bunker gear. Continue to cool fire exposed cylinders until well after flames have been extinguished.

Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. Stop the flow of gas or remove cylinder to an outdoor area if this can be done without risk. Ventilate enclosed areas. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Norco/NorLab location.

Handling and Storage

Electrical Classification:

Non-hazardous.

Carbon monoxide can be handled in all commonly used metals up to approximately 500 psig (3450 kPa). Above that pressure it forms toxic and corrosive carbonyl compounds with some metals. Carbon steels, aluminum alloys, copper and copper alloys, low carbon stainless steels and nickel-based alloys such as Hastelloy A, B & C are recommended for higher pressure applications.

Use only in well-ventilated areas. Valve protection caps must remain in place unless the cylinder is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when

Handling and Storage Continued

connecting cylinder to lower pressure (< 3000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a “first in-first out” inventory system to prevent full cylinders from being stored for excessive periods of time. Post “NO SMOKING OR OPEN FLAMES” signs in the storage or use area.

For additional recommendations, consult Compressed Gas Association’s Pamphlet P-1.

Exposure Controls, Personal Protection

Engineering Controls:

General ventilation used in combination with local exhaust ventilation as necessary to control air contaminants to at or below acceptable exposure guidelines.

Eye/Face Protection:

Safety goggles or glasses.

Skin Protection:

Protective gloves made of any suitable material.

Respiratory Protection:

For emergency release use a NIOSH approved positive pressure air line with mask and escape bottle or self-contained breathing apparatus using at a minimum grade D air.

Other/General Protection:

Safety shoes, safety shower, eyewash “fountain”.

Physical and Chemical Properties

Parameter	Value	Units
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: Not Available	
Evaporation Point	: Not Available	
Boiling point	: Not Available	
Freezing point	: Not Available	
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: Very slight	
Odor threshold	: Not Applicable	
Odor and appearance	: Odorless, colorless gas	

Stability and Reactivity

Stability:

Stable.

Incompatible Materials:

None known.

Hazardous Decomposition Products:

Carbon dioxide.

Hazardous Polymerization:

Does not occur.

Toxicological Information

Inhalation:

Acute carbon monoxide exposure may or may not occur at levels present in this product. An LCLo of 4000 ppm for 30 minutes was reported for human inhalation of carbon monoxide (man). The 1 hour adjusted LC₅₀ for carbon monoxide in rats is 3760 ppm.

Reproductive:

Inhalation of 150 ppm carbon monoxide for 24 hours by pregnant rats produced cardiovascular and behavioral defects in offspring. Toxic effects to fertility were observed in female rats exposed to 1 mg/m³ for 24 hours. Similar effects observed in other mammalian species.

Other:

Mice exposed to concentrations of carbon monoxide at 65 ppm and higher demonstrated dose-dependent effects on the fetus (i.e.: increased mortality and decreased weight) with no signs of maternal toxicity. Fetal carboxyhemoglobin levels are generally 10-15% higher than maternal levels. Overexposure to carbon monoxide may also decrease the likelihood of successful pregnancy. In rats treated with carbon monoxide, the rate of successful pregnancy in the control group was 100% whereas the rate of successful pregnancy in animals treated with 30 and 90 ppm CO was 69% and 38% respectively.

Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Relatively non-toxic. Not expected to bioconcentrate.

Disposal Considerations

Do not attempt to dispose of waste or unused quantities in returnable cylinders. Return in the shipping container, *properly labeled, with any valve outlet plugs or caps secure and valve protection cap in place* to NorLab for proper disposal. Non-refillable containers should be vented in a well-ventilated area then disposed of in compliance with local regulations, or returned to NorLab.

Transport Information

Parameter	United States DOT	Canada TDG
Proper Shipping name:	Compressed Gas, N.O.S. (Nitrogen, Carbon Monoxide)	Compressed Gas, N.O.S.
Hazard Class:	2.2	2.2
Identification Number:	UN 1956	UN 1956
Shipping Label:	Non-flammable Gas	Non-flammable Gas

Regulatory Information

SARA Title III Notification and Information:

SARA Title III – Hazard Classes:

Acute Health hazard
Sudden Release of Pressure Hazard

SARA Title III – Section 313 Supplier Notification:

This product does not contain toxic chemicals subject to reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of CFR 40 Part 372.

This product contains methane which is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

California Proposition 65:

This product contains carbon monoxide, which the State of California has listed as having developmental toxicity.

Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

Disclaimer of Expressed and Implied Warranties:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).