

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Carbon monoxide	Trade Name: Carbon monoxide
Product Use: Many	
Chemical Name: Carbon monoxide, compressed	Synonym: Carbonic oxide, carbon oxide
Chemical Formula: CO	Chemical Family: Permanent Gas
Telephone: Emergencies: * 1-800-363-0042	Supplier /Manufacture: Praxair Canada Inc. 1 City Centre Drive Suite 1200 Mississauga, ON L5B 1M2
	Phone: 905-803-1600
	Fax: 905-803-1682

**Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Praxair sales representative.*

2. Hazards Identification



Emergency Overview



DANGER! Flammable, toxic, odourless high-pressure gas. Acts on blood, causing damage to central nervous system. Can be fatal even with adequate oxygen. Can form explosive mixtures with air. Harmful if inhaled. Self-contained breathing apparatus must be worn by rescue workers. Under ambient conditions, this product is a colourless gas.

ROUTES OF EXPOSURE: Inhalation.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION: Depending on the concentration and duration of exposure, may cause headache, drowsiness, dizziness, excitation rapid breathing, excess salivation, nausea, vomiting, hallucinations, confusion, convulsions, and unconsciousness. With well established poisoning, the mucosal surface will be bright red (cherry red) in colour. Lack of oxygen can cause death.

SKIN CONTACT: No harm expected.

SKIN ABSORPTION: No evidence of adverse effects from available information.

SWALLOWING: This product is a gas at normal temperature and pressure.

EYE CONTACT: No harm expected.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:

Repeated hypoxia from CO exposure will cause gradually increasing central nervous system (CNS) damage, with loss of sensation in the fingers, poor memory, positive Romberg's sign, and mental deterioration. chronic exposure may facilitate the development of atherosclerosis.

OTHER EFFECTS OF OVEREXPOSURE:

Other effects include embryotoxicity, impaired cardiovascular function, pulmonary edema, pneumonia, gross neuropsychiatric damage, memory impairment, permanent CNS damage and cerebral edema with irreversible brain damage. Late, fatal demyelination is a rare, but possible, complication.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

Due to the hypoxia from carboxyhemoglobin formation, may aggravate established coronary and cerebral circulatory insufficiency.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:

None currently known.

CARCINOGENICITY:

Not listed as carcinogen by OSHA, NTP or IARC.

3. Composition and Information on Ingredients

COMPONENTS	CAS NUMBER	CONCENTRATION % by Mole
Carbon monoxide	630-08-0	100

4. First Aid Measures**INHALATION:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

SKIN CONTACT:

Wash with soap and water. If irritation persists or contact has been prolonged, call a physician.

SWALLOWING:

This product is a gas at normal temperature and pressure.

EYE CONTACT:

Flush with water.

NOTES TO PHYSICIAN:

There is no specific antidote. Treatment of over-exposure should be directed at the control of symptoms and the clinical condition. Angina and depression of the ST segment of the electrocardiogram indicated myocardial hypoxia. Exposure to high concentrations can result in cerebral edema. With severe doses, the use of hyperbaric oxygen may be beneficial. Individuals repeatedly overexposed may present positive Romberg's sign.

5. Fire Fighting Measures

FLAMMABLE : Yes.	IF YES, UNDER WHAT CONDITIONS?	Forms explosive mixtures with air and oxidizing agents. Keep away from flames, heat, and sparks.
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EXTINGUISHING MEDIA:

CO2, dry chemical, water spray or fog.

PRODUCTS OF COMBUSTION:

Carbon dioxide.

PROTECTION OF FIREFIGHTERS:

DANGER! Evacuate all personnel from danger area. Immediately cool cylinders with water spray from maximum distance taking care not to extinguish flames. Remove ignition source if without risk. If flames are accidentally extinguished, explosive re-ignition may occur; therefore, appropriate measures should be taken; e.g., total evacuation. Reapproach with extreme caution. Use self-contained breathing apparatus. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area if without risk. Allow fire to burn out.

SPECIFIC PHYSICAL AND CHEMICAL HAZARDS:

Flammable, toxic gas. Cannot be detected by odour. Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat or fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable and toxic vapours may spread. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved device. No part of a container should be subjected to temperature higher than 52 C. Most containers are provided with a pressure relief devices to vent contents when they are exposed to elevated temperature.

SENSITIVITY TO IMPACT:

Avoid impact against container.

SENSITIVITY TO STATIC DISCHARGE:

Possible, ground all equipment.

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:

Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

FLAMMABLE LIMITS IN AIR, % by volume:

LOWER: 12

UPPER: 74

FLASH POINT:

Not applicable.

AUTOIGNITION TEMPERATURE: 609°C (1128.2°F)

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Personal Precautions:

DANGER! Immediately evacuate all personnel from danger area. **DANGER:** Poisonous, odourless, flammable gas. Forms explosive mixtures with air. Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapours with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well ventilated area. Prevent runoff from contaminating surrounding environment. **CAUTION:** Poisonous, flammable vapours may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

Environmental Precautions:

Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, provincial, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN HANDLING:

Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Electrical equipment must be non-sparking or explosion-proof. Leak check system with soapy water; never use a flame. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions, see Section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to Section 16 for the address and phone number along with a list of other available publications.

PRECAUTIONS TO BE TAKEN IN STORAGE:

Store and use with adequate ventilation. Separate flammable cylinders from oxygen, chlorine, and other oxidizers by at least 6 m or use a barricade of non-combustible material. This barricade should be at least 1.5 m high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 52 C. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

Toxic, flammable high-pressure gas. May be fatal if inhaled. Do not breathe gas. Use only in a closed system. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only spark-proof tools and explosion-proof equipment. Keep away from heat, sparks, and open flame. **May form explosive mixtures with air.** Ground all equipment. Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. **When returning cylinder to supplier,** be sure valve is closed, then install valve outlet plug tightly. **Never work on a pressurized system.** If there is a leak, close the cylinder valve. Vent the system down in a safe and environmentally sound manner in compliance with all federal, provincial, and local laws; then repair the leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.**

RECOMMENDED PUBLICATIONS:

Additional information on storage, handling, and use of this product is provided in **NFPA 55: Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders**, published by the National Fire Protection Association.

See also Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

8. Exposure Controls/Personal Protection

INGREDIENTS	CAS NUMBER	LD ₅₀ (Species & Routes)	LC ₅₀ (Rat, 4 hrs.)	Exposure Limits
Carbon monoxide	630-08-0	Not applicable.	1807 ppm.	25 ppm.

IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH):

VENTILATION/ENGINEERING CONTROLS:**LOCAL EXHAUST:** Use explosion-proof ventilation equipment.**MECHANICAL (General):** Inadequate.
See SPECIAL.**SPECIAL:** Use only in a closed system.**OTHER:** See SPECIAL.**PERSONAL PROTECTION:****RESPIRATORY PROTECTION:** Use an air-supplied respirator or a full-face, positive-pressure, self-contained breathing apparatus when working in confined space or where local exhaust or ventilation does not keep exposure below TLV. Select in accordance with the provincial regulations or guidelines. Selection should also be based on the current CSA standards Z94.4, "Selection, care and use of respirators". Respirators should be approved by NIOSH and MSHA.**SKIN PROTECTION:** Wear work gloves when handling cylinders.**EYE PROTECTION:** Wear safety glasses when handling cylinders.

Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.**9. Physical and Chemical Properties**

PHYSICAL STATE: Gas. (Compressed Gas)	FREEZING POINT: -207°C (-340.6°F)	pH: Not applicable.
BOILING POINT: -191.5°C (-312.7°F)	VAPOUR PRESSURE: Not applicable.	MOLECULAR WEIGHT: 28.01 g/mole
SPECIFIC GRAVITY: LIQUID (Water = 1) Not applicable.	SOLUBILITY IN WATER: Negligible.	
SPECIFIC GRAVITY: VAPOUR (air = 1) 0.9676 g/ml @ 21.1 C	EVAPORATION RATE (Butyl Acetate=1): Not available.	COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable.
VAPOUR DENSITY: 0.0016 g/ml @ 21.1 C	% VOLATILES BY VOLUME: 100% (v/v).	ODOUR THRESHOLD: Odourless.
APPEARANCE & ODOUR: Colourless. Odourless gas		

10. Stability and Reactivity

STABILITY:	The product is stable.
CONDITIONS OF CHEMICAL INSTABILITY:	Elevated temperatures, in excess of 400 C.
INCOMPATIBILITY (materials to avoid):	Oxidizing agents, oxygen, flammables, metal oxides, metals in the presence of moisture, and/or sulphur compounds.
HAZARDOUS DECOMPOSITION PRODUCTS:	Carbon monoxide will decompose to form carbon dioxide and carbon above 400 C.
HAZARDOUS POLYMERIZATION:	Will not occur.
CONDITIONS TO AVOID:	Forms explosive mixtures with air and oxidizing agents.
CONDITIONS OF REACTIVITY:	Forms explosive mixtures with air and oxidizing agents.

11. Toxicological Information

ACUTE DOSE EFFECTS: See Section 2.

STUDY RESULTS:

None known.

12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. The components of this mixture are not listed as marine pollutants by TDG Regulations.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. Transport Information

TDG/IMO SHIPPING NAME: Carbon monoxide, compressed

HAZARD CLASS:	CLASS 2.3:(2.1) Toxic gas and Flammable gas.	IDENTIFICATION #:	UN1016	PRODUCT REPORTABLE QUANTITY(PRQ):	Any accidental release of a quantity that could pose a danger to public safety or any sustained release of 10 minutes or more.
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SHIPPING LABEL(s): Toxic gas, flammable gas

PLACARD (When Required): Toxic gas

SPECIAL SHIPPING INFORMATION:

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, non-ventilated compartment of a vehicle can present serious safety hazard.

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, provincial, and local regulations. 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.

WHMIS (Canada): CLASS A: Compressed gas.
CLASS B-1: Flammable gas.
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

This product is on the DSL list.

International Regulations:

EINECS: Not available.
DSCL (EEC): R20- Harmful by inhalation.

International Lists: No products were found.

16. Other Information

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.

HAZARD RATING SYSTEM:

HMIS RATINGS:

HEALTH 1
FLAMMABILITY 4
PHYSICAL HAZARD 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-350
PIN-INDEXED YOKE: Not available.
ULTRA-HIGH-INTEGRITY CONNECTION: CGA-724 NOTE: Do not use a nickel gasket.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax (703) 961-1831, website: www.cganet.com.

AV-1 Safe Handling and Storage of Compressed Gas
P-1 Safe Handling of Compressed Gases in Containers
V-1 Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7 Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
-- Handbook of Compressed Gases, Fifth Edition

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

PREPARATION INFORMATION:

DATE: October 15, 2013

DEPARTMENT: Safety and Environmental Services

TELEPHONE: 905-803-1600

The opinions expressed herein are those of qualified experts within Praxair Canada Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair Canada Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair Canada Inc. requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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Praxair Canada Inc.
1 City Centre Drive
Suite 1200
Mississauga, ON L5B 1M2