

Material Safety Data Sheet



Carbon monoxide

Section 1. Chemical product and company identification

Commercial name(s) : Carbon monoxide
Material uses : Various.
Supplier/Manufacturer : Air Liquide Canada Inc.
1250, René-Lévesque West, Suite 1700
Montreal, QC H3B 5E6
In case of emergency : (514) 878-1667

Section 2. Hazards identification

Physical state : Gas.
Emergency overview : DANGER!
FLAMMABLE GAS. MAY CAUSE FLASH FIRE. HIGH PRESSURE GAS. MAY BE FATAL IF INHALED. CAN CAUSE TARGET ORGAN DAMAGE. DEVELOPMENTAL HAZARD - CAN CAUSE ADVERSE DEVELOPMENTAL EFFECTS.
Keep away from sources of ignition. Keep away from heat (<52°C/125°F). Use only with adequate ventilation. Extremely hazardous gas under pressure. Keep cylinder valve closed when the product is not used. Gas may accumulate in confined areas.

Routes of entry : Dermal contact. Eye contact. Inhalation.
Potential acute health effects
Inhalation : Very toxic by inhalation. Depending on the level and period of exposure, the following symptoms may occur : headache, dizziness, palpitations, weakness, nausea that may be followed by convulsions, fainting and death. Because it is a colorless and odorless gas, nothing will warn from its presence, if only, the above symptoms. Alarmed detectors should be used when toxic quantities may be released.
The transport of oxygen in blood ensured by haemoglobin will be slowed down because carboxyhaemoglobin instead of oxyhaemoglobin will be formed in lungs. The affinity of haemoglobin for carbon monoxide is 200 to 300 higher than for oxygen. All related health hazards will be caused by slow respiration of cells which will damage the central nervous system, collapse the cardiovascular system, cause kidney insufficiency, coma, etc.

Skin : No known significant effects or critical hazards.
Eyes : No known significant effects or critical hazards.
Ingestion : Since the product is a gas, it will probably be inhaled rather than ingested. Consider first the preventive measures in case of inhalation.

Potential chronic health effects : CARCINOGENIC EFFECTS: Not classified or listed by IARC, NTP, OSHA and ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Classified 1 by European Union.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

	CAS number	mole %
Canada Carbon monoxide	630-08-0	100

This material is classified hazardous under the WHMIS Controlled Product Regulation in Canada.
See Sections 8, 11, 14 and 15 for details.

Section 4. First aid measures

Prompt medical attention is mandatory in all cases of overexposure to this gas. Rescue personnel should wear a self-contained breathing apparatus and be aware of extreme fire and explosion hazard.

- Inhalation** : In case of inhalation, all persons, still conscious, must be brought far from the contaminated area and allowed to breath fresh air. The short time taken for this operation is essential. All unconscious persons must be carried outside from the contaminated area and given cardiopulmonary resuscitation (CPR) with a supplementary of oxygen. Others should be treated according to their symptoms and needs.
- Administration of oxygen under high pressure (up to 2 to 2,5 atmospheres) ensures good results. Consider any exposure as a potentially toxic dose. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water. Get medical attention if symptoms occur.
- Eye contact** : Individual in contact with a gas should not wear contact lenses. Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 20 minutes. Get medical attention immediately.
- Ingestion** : Since the product is a gas, it will probably be inhaled rather than ingested. Consider first the preventive measures in case of inhalation.
- Notes to physician** : Effects of contact or inhalation may be delayed. Provide general supportive measures. Oxygen is extremely beneficial. The medical doctor must be warned that the person inhaled a very toxic gas.

Section 5. Fire fighting measures

- Flammability of the product** : Flammable.
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge.
Highly flammable in the presence of the following materials or conditions: heat.
- Fire-fighting media and instructions** : In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area.
Extremely flammable. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : EVACUATE ALL PERSONNEL FROM AFFECTED AREA.
Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is on container or container valve, contact the closest Air Liquide Canada location.
- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

- Handling** :
- Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Use explosion-proof electrical equipment (ventilating, lighting and material handling). Valve protection caps must remain in place unless cylinder is secured with valve outlet piped to usage point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure 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 to the cylinder. Do not tamper with (valve) safety device. Close valve after each use and when empty.
- Storage** :
- 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 52°C/125°F. Cylinders must 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 being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no source of ignition in the storage or use area. Segregate from oxidizing materials.

Section 8. Exposure controls/personal protection

- Engineering controls** :
- Ventilation is normally required when handling or using this product. Ensure that eyewash stations and safety showers are close to the workstation location.
- Personal protection**
- Respiratory** :
- Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** :
- Wear suitable gloves for the application.
- Eyes** :
- Splash goggles.
- Skin/Body** :
- Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Overalls buttoned to the neck and wrist. Fire retardant clothing may be required when handling or using flammable products.
 - Metal cap, safety shoes are recommended when handling cylinders.
 - Static dissipative footwear is recommended when handling or using flammable products.



Some applications of this product may require additional or other specific protective clothings. Please consult your supervisor.

- Personal protection in case of a major leak** :
- Safety glasses, goggles or face shield. Impervious gloves. Full suit. Metal cap, safety boots. Wear MSHA/NIOSH-approved self-contained breathing apparatus or equivalent and full protective gear.

Product name

Canada

Carbon monoxide

Exposure limits

CA Alberta Provincial (Canada, 10/2006).

8 hrs OEL: 25 ppm 8 hour(s).

CA British Columbia Provincial (Canada, 7/2007).

TWA: 25 ppm 8 hour(s).

STEL: 100 ppm 15 minute(s).

CA Ontario Provincial (Canada, 3/2007).

TWAEV: 25 ppm 8 hour(s).

STEV: 100 ppm 15 minute(s).

CA Quebec Provincial (Canada, 12/2006).

TWAEV: 35 ppm 8 hour(s).
 STEV: 200 ppm 15 minute(s).

Consult local authorities for acceptable exposure limits.

In Canadian provinces where no value is specifically suggested, the lowest value above should be used.

Section 9. Physical and chemical properties

Physical state	: Gas.
Color	: Colorless.
Odor	: Odorless.
Molecular weight	: 28.01 g/mole
Molecular formula	: CO
Auto-ignition temperature	: 608.89°C (1128°F)
Flammable limits	: Lower: 12.5% Upper: 63%
Boiling/condensation point	: -191.66°C (-313°F)
Melting/freezing point	: -198.88°C (-326°F)
Critical temperature	: -140.1°C (-220.2°F)
Specific gravity	: 0.0012
Vapor density	: 0.97 [Air = 1]

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data	
IDLH	: 1200 ppm
Acute Effects	
Inhalation	: Very toxic by inhalation. Depending on the level and period of exposure, the following symptoms may occur : headache, dizziness, palpitations, weakness, nausea that may be followed by convulsions, fainting and death. Because it is a colorless and odorless gas, nothing will warn from its presence, if only, the above symptoms. Alarmed detectors should be used when toxic quantities may be released.
	The transport of oxygen in blood ensured by haemoglobin will be slowed down because carboxyhaemoglobin instead of oxyhaemoglobin will be formed in lungs. The affinity of haemoglobin for carbon monoxide is 200 to 300 higher than for oxygen. All related health hazards will be caused by slow respiration of cells which will damage the central nervous system, collapse the cardiovascular system, cause kidney insufficiency, coma, etc.
Skin	: No known significant effects or critical hazards.
Eyes	: No known significant effects or critical hazards.
Ingestion	: Since the product is a gas, it will probably be inhaled rather than ingested. Consider first the preventive measures in case of inhalation.
Potential chronic health effects	: CARCINOGENIC EFFECTS: Not classified or listed by IARC, NTP, OSHA and ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Classified 1 by European Union.
Target organs	: Causes damage to the following organs: blood, lungs, cardiovascular system, central nervous system (CNS).

Section 12. Ecological information




Products of degradation : These gases are released as is in the atmosphere.

Section 13. Disposal considerations

Disposal : Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to Air Liquide Canada for proper disposal. For emergency disposal, contact the closest Air Liquide Canada location.

Section 14. Transport information

NAERG : 119

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label
TDG Classification	UN1016	CARBON MONOXIDE, COMPRESSED	2.3 (2.1)	-	
IMDG Class	UN1016	CARBON MONOXIDE, COMPRESSED	2.3 (2.1)	-	
IATA-DGR Class	UN1016	CARBON MONOXIDE, COMPRESSED	2.3 (2.1)	-	

PG* : Packing group

Additional 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 and should be discouraged.

UN

-

TDG

-

IMDG

-

IATA

Passenger and Cargo Aircraft

Quantity limitation: Forbidden

Section 15. Regulatory information

Canada

WHMIS (Canada)

- : Class A: Compressed gas.
- Class B-1: Flammable gas.
- Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
- Class D-2A: Material causing other toxic effects (Very toxic).



Canadian lists

- : **CEPA Toxic substances:** This material is not listed.
- Canadian ARET:** This material is not listed.
- Canadian NPRI:** This material is listed.
- Alberta Designated Substances:** This material is not listed.
- Ontario Designated Substances:** This material is not listed.
- Quebec Designated Substances:** This material is not listed.

Canada inventory (DSL/NDSL)

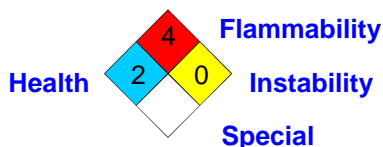
- : This material is listed or exempted.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	*	3
Fire hazard		4
Physical Hazard		0
Personal protection		G

National Fire Protection Association (U.S.A.)



HAZARD RATINGS

- 4- Extreme
- 3- Serious
- 2- Moderate
- 1- Slight
- 0- Minimal

See section 8 for more detailed information on personal protection.

References

- : ANSI Z400.5, MSDS Standard, 2004. - Manufacturer's Material Safety Data Sheet. - Canada Gazette Part II, Vol. 122, No. 2. Registration SOR/88-64, 31 December 1987. Hazardous Products Act "Ingredient Disclosure List" - Canadian Transport of Dangerous Goods, Regulations and Schedules, Clear Language version 2005. CGA C-7 Guide to the Preparation of Precautionary Labels and Marking of Compressed Gas Containers. CGA P-20 Standard for Classification of Toxic Gas Mixtures. CGA P-23 Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components.

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