

## Chemical Profiles

# Carbon Monoxide

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What are other names or identifying information for carbon monoxide?

**CAS Registry No.:** 630-08-0

**Other Names:** CO

**Main Uses:** Manufacture of other chemicals, metallurgy, calibration gas.

**Appearance:** Colourless gas.

**Odour:** Odourless

**Canadian TDG:** UN1016

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What is the WHMIS classification?

According to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), [carbon monoxide](#) can be classified as:

Flammable gases - Category 1



Gases under pressure - Compressed gas



Acute toxicity - inhalation - Category 3



Reproductive toxicity - Category 1A (Adverse effects on the development of the offspring)



Specific target organ toxicity - single exposure - Category 1



The signal word is danger.

The hazard statements include:

- Extremely flammable gas

- Contains gas under pressure; may explode if heated
- Toxic if inhaled
- May damage fertility or the unborn child
- Causes damage to organs

Please note that this classification was retrieved from the [CNESST](#) site on September 23, 2022 and was established by CNESST personnel to the best of their knowledge based on data obtained from scientific literature and it incorporates the criteria contained in the *Hazardous Products Regulations* (SOR/2015-17). It does not replace the supplier's classification which can be found on its Safety Data Sheet.

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## What are the most important things to know about carbon monoxide in an emergency?

**Emergency Overview:** Colourless gas. Odourless. EXTREMELY FLAMMABLE GAS. Distant ignition and flashback are possible. COMPRESSED GAS. Contains gas under pressure. May explode if heated. VERY TOXIC. Fatal if inhaled. Causes damage to blood. TERATOGEN/EMBRYOTOXIN. May damage the unborn child. May cause frostbite.

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## What are the potential health effects of carbon monoxide?

**Main Routes of Exposure:** Inhalation.

- **Inhalation:** VERY TOXIC. Can harm the blood (decreased ability to carry oxygen). Symptoms may include headache, nausea, weakness, exhaustion, dizziness, drowsiness and confusion. May cause permanent damage to organs including the brain and heart.
- **Skin Contact:** Not irritating. Direct contact with the liquefied gas can chill or freeze the skin (frostbite). Symptoms of mild frostbite include numbness, prickling and itching. Symptoms of more severe frostbite include a burning sensation and stiffness. The skin may become waxy white or yellow. Blistering, tissue death and infection may develop in severe cases.
- **Eye Contact:** Not irritating. Direct contact with the liquefied gas can freeze the eye. Permanent eye damage or blindness can result.
- **Ingestion:** Not a relevant route of exposure (gas).
- **Effects of Long-Term (Chronic) Exposure:** Conclusions cannot be drawn from the limited studies available. May harm the nervous system. May harm the heart.

- **Carcinogenicity:** Not a carcinogen.
    - International Agency for Research on Cancer (IARC): Not specifically evaluated.
    - American Conference for Governmental Industrial Hygienists (ACGIH): Not specifically designated.
  - **Teratogenicity / Embryotoxicity:** DEVELOPMENTAL HAZARD. May harm the unborn child. Has been associated with: low birth weight or size, learning disabilities, and miscarriage.
  - **Reproductive Toxicity:** Not known to be a reproductive hazard.
  - **Mutagenicity:** Not known to be a mutagen. Conclusions cannot be drawn from the limited studies available.
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## What are first aid measures for carbon monoxide?

**Inhalation:** Take precautions to prevent a fire (e.g., remove sources of ignition). Take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment). Move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. If the heart has stopped, trained personnel should start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

**Skin Contact:** Not applicable (gas). Liquefied gas: quickly remove victim from source of contamination. DO NOT attempt to rewarm the affected area on site. DO NOT rub area, flush with water, or apply direct heat. Gently remove clothing or jewelry that may restrict circulation. Carefully cut around clothing that sticks to the skin and remove the rest of the garment. Loosely cover the affected area with a sterile dressing. Do not remove frozen clothing from frostbitten areas. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

**Eye Contact:** Not applicable (gas). Liquefied gas: immediately and flush with large amounts of gently flowing water for at least 15 minutes, occasionally lifting the upper and lower eyelids. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

**Ingestion:** Not applicable (gas).

**First Aid Comments:** Some of the first aid procedures recommended here require advanced first aid training. All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

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## What are fire hazards and extinguishing media for carbon monoxide?

**Flammable Properties:** EXTREMELY FLAMMABLE GAS. Can easily ignite. Can readily form explosive mixture with air at room temperature.

**Suitable Extinguishing Media:** Carbon dioxide, dry chemical powder, appropriate foam, water spray or fog. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

**Specific Hazards Arising from the Chemical:** Gas or vapour may accumulate in hazardous amounts in low-lying areas especially inside confined spaces, resulting in a health hazard. Heat from fire can cause a rapid build-up of pressure inside cylinders. Explosive rupture and a sudden release of large amounts of gas may result. Cylinder may rocket. In a fire, the following hazardous materials may be generated: Very toxic carbon monoxide, carbon dioxide.

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## What are the stability and reactivity hazards of carbon monoxide?

- **Chemical Stability:** Normally stable.
  - **Conditions to Avoid:** Open flames, sparks, static discharge, heat and other ignition sources.
  - **Incompatible Materials:** Increased risk of fire and explosion on contact with: oxidizing agents (e.g. peroxides), halogens (e.g. chlorine), metals (e.g. aluminum, lithium). Not corrosive to: aluminum alloys, stainless steel.
  - **Hazardous Decomposition Products:** None known.
  - **Possibility of Hazardous Reactions:** None known.
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## What are unintentional release measures for carbon monoxide?

**Personal Precautions:** Evacuate the area immediately. Isolate the hazard area. Keep out unnecessary and unprotected personnel. Use personal protective equipment as required. Eliminate all ignition sources. Use grounded, explosion-proof equipment. Vapour or gas may accumulate in hazardous amounts in low-lying areas especially inside confined spaces, if ventilation is not sufficient.

**Methods for Containment and Clean-up:** Ventilate the area to prevent the gas from accumulating, especially in confined spaces. Stop or reduce leak if safe to do so. Knock down gas with fog or fine water spray. Dike and recover contaminated water for appropriate disposal.

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## What handling and storage practices should be used when working with carbon monoxide?

**Handling:** Before handling, it is important that all engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. Only trained personnel should work with this product. Immediately report leaks, spills or failures of the safety equipment (e.g., ventilation system). In event of a spill or leak, immediately put on escape-type respirator and exit the area. Prevent uncontrolled release of product. Prevent unintentional contact with incompatible chemicals. Eliminate heat and ignition sources such as sparks, open flames, hot surfaces and static discharge. Post "No Smoking" signs. Use the pressure regulator appropriate for cylinder pressure and contents. Secure cylinder in an upright position. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop.

**Storage:** Store in an area that is: cool, dry, well-ventilated, out of direct sunlight and away from heat and ignition sources, temperature-controlled. Always secure (e.g., chain) cylinders in an upright position to a wall, rack or other solid structure. Label container with date received, date opened and disposal date. Use a first-in, first-out inventory system. Empty containers may contain hazardous residue. Store separately. Keep closed. Comply with all applicable health and safety regulations, fire and building codes.

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## What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for carbon monoxide?

ACGIH® TLV® - TWA: 25 ppm BEI

**Exposure Guideline Comments:** TLV® = Threshold Limit Value. TWA = Time-Weighted Average. BEI® = Biological Exposure Index.

Adapted from: 2022 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on [Canadian Governmental Occupational Health & Safety Departments](#).

A list of which acts and regulations that cover [exposure limits to chemical and biological agents](#) is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

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## What are the engineering controls for carbon monoxide?

**Engineering Controls:** Use local exhaust ventilation, if general ventilation is not adequate to control amount in the air. Exhaust directly to the outside, taking any necessary precautions for environmental protection. Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas where this product is used and stored.

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## What Personal Protective Equipment (PPE) is needed when working with carbon monoxide?

**Eye/Face Protection:** Not required but it is good practice to wear safety glasses or chemical safety goggles.

**Skin Protection:** If there is a risk of contacting liquid CO: wear chemical protective clothing e.g. gloves, aprons, boots. [Suitable materials](#) include (8 hours): Butyl rubber, Viton®, Viton®/Butyl rubber. Not recommended: natural rubber, neoprene rubber, nitrile rubber, polyvinylchloride (PVC), Tychem ® 5000.

### **Respiratory Protection:**

Up to 350 ppm:  
(APF = 10) Any supplied-air respirator.

Up to 875 ppm:  
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 1200 ppm:  
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the [NIOSH Pocket Guide to Chemical Hazards](#) for more information.

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## Disclaimer

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