



# Indoor Air Quality

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## Sources of Indoor Air Pollution - Carbon Monoxide (CO)

### Definition

Colorless gas or liquid; practically odorless. Burns with a violet flame. Slightly soluble in water; soluble in alcohol and benzene. Specific gravity 0.96716; boiling point -190°C; solidification point -207°C; specific volume 13.8 cu. ft./lb. (70°F). Auto ignition temperature (liquid) 1128°F. Classed as an inorganic compound. Source: "The Condensed Chemical Dictionary," 9th ed., revised by Gessner G. Hawley, Van Nostrand Reinhold Co., NY, 1977.

### Sources of Carbon Monoxide

Unvented kerosene and gas space heaters; leaking chimneys and furnaces; back-drafting from furnaces, gas water heaters, wood stoves, and fireplaces; gas stoves; generators and other gasoline powered equipment; automobile exhaust from attached garages; and tobacco smoke.

### Health Effects Associated with Carbon Monoxide

At low concentrations, fatigue in healthy people and chest pain in people with heart disease. At higher concentrations, impaired vision and coordination; headaches; dizziness; confusion; nausea. Can cause flu-like symptoms that clear up after leaving home. Fatal at very high concentrations.

### Levels in Homes

Average levels in homes without gas stoves vary from 0.5 to 5 parts per million (ppm). Levels near properly adjusted gas stoves are often 5 to 15 ppm and those near poorly adjusted stoves may be 30 ppm or higher.

### Steps to Reduce Exposure to Carbon Monoxide

- Keep gas appliances properly adjusted.
- Consider purchasing a vented space heater when replacing an unvented one.
- Use proper fuel in kerosene space heaters.
- Install and use an exhaust fan vented to outdoors over gas stoves.
- Open flues when fireplaces are in use.
- Choose properly sized wood stoves that are certified to meet EPA emission standards. Make certain that doors on all wood stoves fit tightly.
- Have a trained professional inspect, clean, and tune-up central heating system (furnaces, flues, and chimneys) annually. Repair any leaks promptly.
- Do not idle the car inside garage.

### Carbon Monoxide - from the IAQ Tools for Schools Kit - IAQ Coordinator's Guide

[www.epa.gov/iaq/schools/tfs/guidee.html](http://www.epa.gov/iaq/schools/tfs/guidee.html)

#### Sources of Indoor Air Pollution

- [Asbestos](#)
- [Biological Pollutants](#)
- [Carbon Monoxide](#)
- [Formaldehyde/Pressed Wood Products](#)
- [Household Cleaning and Maintenance, Personal Care, or Hobbies](#)
- [Lead](#)
- [Nitrogen Dioxide](#)
- [Pesticides](#)
- [Radon](#)
- [Respirable Particles](#)
- [Secondhand Smoke/Environmental Tobacco Smoke](#)
- [Stoves, Heaters, Fireplaces, and Chimneys](#)

Read "[The Inside Story: A Guide to Indoor Air Quality](#)" [EPA 402-K-93-007, April 1995]

Description	Sources	Standards or Guidelines
Carbon monoxide (CO) is a colorless and odorless gas. It results from incomplete oxidation of carbon in combustion processes.	Common sources of CO in schools are from improperly vented furnaces, malfunctioning gas ranges, or exhaust fumes that have been drawn back into the building. Worn or poorly adjusted	The OSHA standard for workers is 50 ppm for 1-hour. NIOSH recommends no more than 35 ppm for 1-hour. The US. National Ambient Air Quality Standards for CO are 9 ppm for 8-

	and maintained combustion devices ( e.g. boilers, furnaces) can be significant sources, or a flue that is improperly sized, blocked, disconnected, or leaking. Auto, truck, or bus exhaust from attached garages, nearby roads, or idling vehicles in parking areas can also be a source.	hours and 35 ppm for 1-hour. The Consumer Product Safety Commission recommends levels not to exceed 15 ppm for 1-hour or 25 ppm for 8-hours.
<b>Health Effects</b>	<b>Control Measures</b>	
CO is an asphyxiate. An accumulation of this gas may result in a varied constellation of symptoms deriving from the compound's affinity for and combination with hemoglobin, forming carboxy-hemoglobin (COHb) and disrupting oxygen transport. Tissues with the highest oxygen needs myocardium, brain, and exercising muscle are the first affected. Symptoms may mimic influenza and include fatigue, headache, dizziness, nausea and vomiting, cognitive impairment, and tachycardia. At high concentrations CO exposure can be FATAL.	Combustion equipment must be maintained to assure that there are no blockages and air and fuel mixtures must be properly adjusted to ensure more complete combustion. Vehicular use should be carefully managed adjacent to buildings and in vocational programs. Additional ventilation can be used as a temporary measure when high levels of CO are expected for short periods of time.	

## Additional Resources

### Links

Office of Air and Radiation page - "[CO - How Carbon Monoxide Affects the Way We Live and Breathe](#)"

#### National Center for Environmental Health

Air and Respiratory Health Branch  
Centers for Disease Control and Prevention

[Checklist for Prevention of Carbon Monoxide Poisoning](#) [EXIT disclaimer](#)

#### U.S. Consumer Product Safety Commission,

Office of Information and Public Affairs,  
Washington, D.C. 20207

[Carbon Monoxide Questions and Answers](#) (CPSC document #466) [EXIT disclaimer](#)

The U.S. Consumer Product Safety Commission protects the public from the unreasonable risk of injury or death from 15,000 types of consumer products under the agency's jurisdiction. To report a dangerous product or a product-related injury, you can go to CPSC's forms page - [www.cpsc.gov/talk.html](http://www.cpsc.gov/talk.html) [EXIT disclaimer](#) and use the first on-line form on that page. Or, you can call CPSC's hotline at (800) 638-2772 or CPSC's teletypewriter at (800) 638-8270, or send the information to [info@cpsc.gov](mailto:info@cpsc.gov).

#### American Lung Association Fact Sheet on Carbon Monoxide

[www.lungusa.org/air/carbon\\_factsheet99.html](http://www.lungusa.org/air/carbon_factsheet99.html) [EXIT disclaimer](#)

Occupational Safety and Health Administration's Fact Sheet on Carbon Monoxide (a pdf file) -

[www.osha.gov/OshDoc/data\\_General\\_Facts/carbonmonoxide-factsheet.pdf](http://www.osha.gov/OshDoc/data_General_Facts/carbonmonoxide-factsheet.pdf) [EXIT disclaimer](#)

About Your House - Carbon Monoxide, Canadian Mortgage and Housing Corporation (CMHC) [www.cmhc-schl.gc.ca/en/burema/gesein/abhose/abhose\\_ce25.cfm](http://www.cmhc-schl.gc.ca/en/burema/gesein/abhose/abhose_ce25.cfm) [EXIT disclaimer](#)

**U.S. Coast Guard Boating Safety warning:** <http://www.uscgboating.org/news/boatingview.aspx?id=22> [EXIT disclaimer](#)

## CPSC Recommends Carbon Monoxide Alarm for Every Home (January 18, 2001 CPSC Release # 01-069)

After a recent rash of carbon monoxide poisonings - including incidents in Maryland, Pennsylvania and New Jersey -- the U.S. Consumer Product Safety Commission (CPSC) is repeating its recommendation that every home should have a carbon monoxide (CO) alarm. CPSC also urges consumers to have a professional inspection of all fuel-burning appliances -- including furnaces, stoves, fireplaces, clothes dryers, water heaters, and space heaters -- to detect deadly carbon monoxide leaks. CPSC recommends that every home should have at least one CO alarm that meets the requirements of the most recent Underwriters Laboratories (UL) 2034 standard or International Approval Services 6-96 standard.

[www.cpsc.gov/cpscpub/prerele/prhtml01/01069.html](http://www.cpsc.gov/cpscpub/prerele/prhtml01/01069.html)

## Publications/Resources

### [Protect Your Family and Yourself from Carbon Monoxide Poisoning, October 1996 \(402-F-96-005\)](#)

Discusses health hazards associated with exposure to carbon monoxide (CO), a colorless, odorless gas which can cause headaches, dizziness, nausea, faintness, and, at high levels, death. Provides guidance on what to do if you think you are suffering from CO poisoning and what to do to prevent exposure to CO. Also included is a brief discussion about carbon monoxide detectors.

[Proteja su vida y la de su familia evitando el envenenamiento con monóxido de carbono](#) (ref. # 402-F-97-004)

This fact sheet has also been translated into **Vietnamese (ref. # 402-F-96-005C)**, **Chinese (ref. # 402-F-96-005A)**, and **Korean (ref. # 402-F-96-005B)**. To get copies of any of these, contact IAQINFO at 1-800-438-4318.

### [ALERT!! Preventing Carbon Monoxide Poisoning from Small Gasoline-Powered Engines and Tools. \(1996\)](#)

This joint alert from NIOSH, CDPHE, CPSC, OSHA and EPA warns that people using gasoline-powered tools such as high-pressure washers, concrete cutting saws (walk-behind/hand-held), power trowels, floor buffers, welders, pumps, compressors, and generators in buildings or semi-enclosed spaces have been poisoned by Carbon Monoxide. Recommendations for preventing CO poisoning are provided for employers, equipment users, tool rental agencies, and tool manufacturers.

Single copies of the Alert [DHHS (NIOSH) Publication No. 96-118] are available for free from: **Publication Dissemination, IED, National Institute for Occupational Safety and Health**; 4676 Columbia Parkway, Cincinnati, OH 45226  
fax number: (513) 533-8573, phone number: 1-800-35-NIOSH (1-800-356-4674)  
e-mail: [pubstaft@niosdt1.em.cdc.gov](mailto:pubstaft@niosdt1.em.cdc.gov) [EXIT disclaimer](#)

### [The "Senseless" Killer, 1993](#)

Prepared by the U.S. Consumer Product Safety Commission, this leaflet describes symptoms of carbon monoxide poisoning, sources of carbon monoxide in the home, and actions that can reduce the risk of carbon monoxide poisoning.

### [What You Should Know About Combustion Appliances and Indoor Air Pollution, 1993 \(400-F-91-100\)](#)

This brochure was prepared by the U.S. Consumer Product Safety Commission, the American Lung Association, and the EPA and answers commonly-asked questions about the effect of combustion appliances (e.g., fuel-burning furnaces, space heaters, kitchen ranges, and fireplaces) on indoor air quality and human health. It describes other sources of combustion pollutants in and around the home and it suggests ways to reduce exposure to such pollutants and encourages proper installation, use, and maintenance of combustion appliances.

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