

Fact Sheet

Carbon Monoxide (CO)

Carbon monoxide, or CO, is an odorless, colorless gas that can cause sudden illness and death in humans and animals.

Introduction

Abbreviated "CO," carbon monoxide is an odorless, invisible, asphyxiating flammable gas that is produced by incomplete combustion (burning) of materials including but not limited to natural gas, propane, gasoline, acetylene, etc.

Each year, as a result of unintentional CO poisoning, more than 20,000 Americans visit the emergency room, more than 4,000 are hospitalized, and more than 400 die. Fatality is highest among Americans 65 and older.

Common sources of CO

CO is found in combustion gases, such as those produced by cars and trucks, small gasoline engines (lawn mowers, weed whips, etc.), stoves, lanterns, burning charcoal and wood, and gas ranges and heating systems.

CO from these sources can build up in enclosed or semi-enclosed spaces. People and animals in these spaces can be poisoned by breathing it.

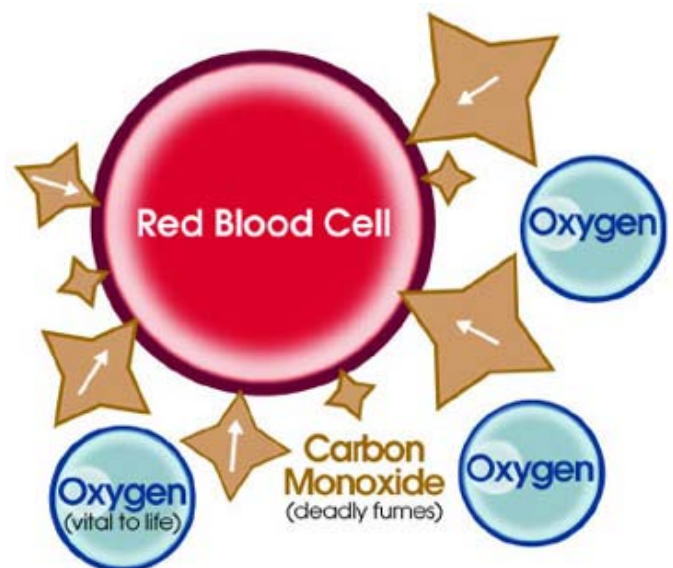
What are the symptoms of CO poisoning?

The most common symptoms of CO poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain, and confusion.

High levels of CO inhalation can cause loss of consciousness and death. Unless suspected, CO poisoning can be difficult to diagnose because the symptoms mimic other illnesses. People who are sleeping or intoxicated can die from CO poisoning before ever experiencing symptoms.

How does CO poisoning work?

Red blood cells pick up CO more quickly than they pick up oxygen. If there is a lot of CO in the air, the body may replace the oxygen in blood with CO. This blocks oxygen from getting into the body, which can damage tissues and result in death.



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Who is at risk of CO poisoning?

All people and animals are at risk of CO poisoning. Certain groups, such as unborn babies, infants, and people with chronic heart disease, anemia, or respiratory problems, are more susceptible to its effects.

Preventing CO poisoning at work and at home

Each year, more Americans die of carbon monoxide poisoning than all other types of poisoning combined. Preventing CO exposures is important both on and off the job.

Gas appliances as a source of CO

One of the most common sources of CO problems—both at home and at work—is gas appliances such as water heaters and furnaces.

- Have your heating system, water heater, and any other gas, oil, or coal burning appliances serviced by a qualified technician every year.
- Do not use portable flameless chemical heaters (catalytic) indoors. Although these heaters don't have a flame, they burn gas and can cause CO to build up inside your home, cabin, or camper.
- If you smell an odor from your gas refrigerator's cooling unit, have an expert service it. An odor from the cooling unit of your gas refrigerator can mean you have a defect in the cooling unit. It could also be giving off CO.

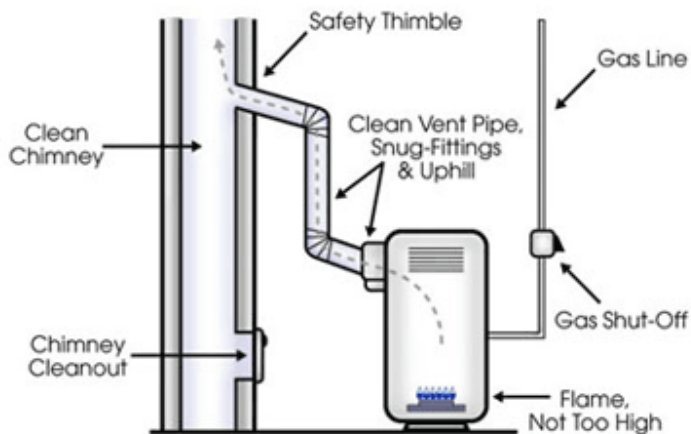
- When purchasing gas equipment, buy only equipment carrying the seal of a national testing agency, such as the American Gas Association or Underwriters' Laboratories.
- Install a battery-operated CO detector in your home and check or replace the battery when you change the time on your clocks each spring and fall.

Proper venting of gas appliances

- All gas appliances must be vented to the exterior of the building so that CO will not build up indoors.
- It's VERY important to check the vents frequently because animals may build nests inside vent pipes to keep warm. These nests may block exhaust gases from flowing from the building properly.
- Never burn anything in a stove or fireplace that isn't vented.
- Have your chimney checked or cleaned every year. Chimneys can be blocked by debris. This can cause CO to build up inside your home or cabin.
- Never patch a vent pipe with tape, gum, or something else. This kind of patch can make CO build up in your home, cabin, or camper.
- Horizontal vent pipes to fuel appliances should not be perfectly level. Indoor vent pipes should go up slightly as they go toward outdoors. This helps prevent CO or other gases from leaking if the joints or pipes aren't fitted tightly.

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Here's the Safe Way to Connect Heating Equipment to the Chimney



Cooking and heating your house or work area when the power is out

- Never use a gas range or oven for heating. Using a gas range or oven for heating can cause a buildup of CO inside your home, cabin, or camper.
- Never use a charcoal grill or a barbecue grill indoors. Using a grill indoors will cause a buildup of CO.
- Never burn charcoal indoors. Burning charcoal — red, gray, black, or white — gives off CO.
- Never use a portable gas camp stove indoors. Using a gas camp stove indoors can cause CO to build up inside your home, cabin, or camper.
- Never use a generator inside your home, basement, or garage or near a window, door, or vent.

CO exposure from vehicles

- Have a mechanic check the exhaust system frequently. A small leak in your car's exhaust system can lead to a buildup of CO inside the car.
- Never run a car or truck in the garage with the garage door shut. CO can build up quickly while your car or truck is running in a closed garage. Never run your car or truck inside a garage that is attached to a house and always open the door to any garage to let in fresh air when running a car or truck inside the garage.
- If you drive a vehicle with a tailgate, when you open the tailgate, you also need to open vents or windows to make sure air is moving through your car. If only the tailgate is open CO from the exhaust will be pulled into the car.

Gas-powered equipment

- Gas-powered equipment such as lawnmowers, weed-whips, pressure washers, etc. may never be run indoors, or wherever there might be limited ventilation.

Minnesota OSHA regulations

There are several relevant MNOSHA regulations.

Carbon monoxide is a hazardous substance and therefore is covered by the Minnesota Employee Right to Know Act (MERTKA). If employees are exposed, or potentially exposed to CO, it must be

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specifically covered in the written MERTKA program and chemical-specific training must be provided (see the [MERTKA fact sheet](#) for more information). Also, a MSDS for CO must be maintained.

MNOSHA also requires that if internal-combustion engine powered forklifts (powered industrial trucks) are operated indoors, employees' exposures to CO must be monitored, using appropriate instruments, on at least a quarterly basis. Household CO detectors are not adequate. Further, employers must ensure that powered industrial truck engine exhaust gases do not contain more than one percent carbon monoxide for propane fueled trucks or two percent carbon monoxide for gasoline fueled trucks measured at idle and at three-fourths throttle during final engine tuning in a regular maintenance program (see MN 5205.0116).

Note also that MNOSHA enforces an 8 hour Time-Weighted Average (TWA) of 35 parts per million. This is much lower than the Federal Permissible Exposure Limit (PEL) of 50 parts per million, which is enforced in other states such as Wisconsin.

Questions

If you have questions on this topic, please contact the Office of Occupational Health and Safety at (612) 626-5008 or uohs@umn.edu, or see the website at <http://www.ohs.umn.edu>.