# What I should know about carbon monoxide

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**Where does carbon monoxide come from?**

CO can be produced by the combustion that occurs from fossil fuel burning appliances like a furnace, clothes dryer, range, oven, water heater, or space heater. When appliances and vents work properly, and there is enough fresh air in your home to allow complete combustion, the trace amounts of CO produced are typically not dangerous. And normally, CO is safely vented outside your home.

Problems may arise when something goes wrong. An appliance can malfunction, a furnace heat exchanger can crack, vents can clog, or debris may block a chimney or flue. Fireplaces, wood burning stoves, gas heaters, charcoal grills, or gas logs can produce unsafe levels of CO if they are unvented or not properly vented. Exhaust can seep into the home from vehicles left running in an attached garage. All these things can cause a CO problem in the home.

**What is carbon monoxide?**

Carbon monoxide (CO) is an invisible, odorless gas. It is a common by-product of incomplete combustion, produced when fossil fuels (like oil, gas or coal) burn. Because you can't see, taste or smell it, carbon monoxide can kill you before you know it's there. Exposure to lower levels over time can make you sick.

**Why is carbon monoxide so dangerous?**

Carbon Monoxide robs you of what you need most: oxygen, which is carried to your cells and tissue by the hemoglobin in your blood. If you inhale even small amounts of CO, it quickly bonds with hemoglobin and displaces oxygen. This produces a toxic compound in your blood called carboxyhemoglobin (COHb). Carboxyhemoglobin produces flu-like symptoms, for example: headaches, fatigue, nausea, dizzy spells, confusion, and irritability. Since symptoms are similar to the flu, carbon monoxide poisoning can be misdiagnosed. As levels of COHb rise, victims suffer vomiting, loss of consciousness, and eventually brain damage or death.

**Who is at risk from carbon monoxide poisoning?**

Everyone is at risk because everyone needs oxygen to survive. Medical experts believe some people are more vulnerable to CO poisoning: unborn babies, infants, children, seniors, and people with heart and lung problems.

**How can I help protect against carbon monoxide poisoning?**

Early warning is important: Install one or more alarms The Consumer Product Safety Commission (CPSC) recommends that every home have at least one carbon monoxide alarm with an audible warning signal installed near the sleeping area. Choose a CO alarm that is Underwriters Laboratories, Inc. (UL) Listed. Look for the UL logo on the package.

Have your appliances checked regularly. Have a qualified appliance technician check all fossil fuel burning appliances, venting and chimney systems at least once a year, or as recommended by the manufacturer.

**Where should I look for potential sources of carbon monoxide in the home?**

- A forced air furnace is frequently the source of leaks and should be carefully inspected by a professional.

- Have a professional measure the concentration of carbon monoxide in the flue gases.

- Check furnace connections to the flue pipes and venting systems to the outside of the home for signs of corrosion, rust, gaps or holes.

- Check furnace filters and filtering systems for dirt or blockage.

- Check forced air fans for proper installation and to assure correct air flow of flue gases. Improper furnace blower installation can result in carbon monoxide build-up because toxic gas is blown into rather than out of the house.

- Check the combustion chamber and internal heat exchanger for cracks, holes, metal fatigue or corrosion – be sure they are clean and free of debris.

- Check burners and ignition system. A flame that is mostly yellow in color in natural gas fired furnaces is often a sign that the fuel is not burning completely and higher levels of carbon monoxide are being released. Oil furnaces can have similar problems. Remember you can't smell carbon monoxide.

- Check fireplaces for closed, blocked or bent flues, soot and debris.

- Check all venting systems to the outside of your home. This includes checking flues and chimneys for cracks, corrosion, holes, debris or blockage. Animals and birds can build nests in chimneys, preventing gases from escaping. Vibrations can shake vent pipes loose from gas dryers or water heaters, preventing CO from being vented properly outside.

- Check all other appliances in the home that use fossil fuels such as natural gas, oil, propane, wood or kerosene. Appliances include water heaters, clothes dryers, kitchen ranges, gas heaters, ovens or cooktops, wood-burning stoves, gas refrigerators or alternative power sources such as generators.

- Pilot lights can be a source of carbon monoxide, because the by-products of combustion are released inside the home rather than vented outside.

- Be sure space heaters are vented properly. Unvented space heaters that use a fossil fuel such as kerosene or propane can release carbon monoxide into the home.

- Barbecue grills should never be operated indoors under any circumstances.

- Stove tops or ovens that operate on fossil fuels should never be used to heat a residence.

- Check the clothes dryer vent opening. Lint may block proper venting outside the house.

**What do I do if my carbon monoxide alarm goes off?**

Never ignore an alarm! It is very possible that you won't be experiencing symptoms of CO poisoning when the alarm sounds. That doesn't mean there is no carbon monoxide present. The alarm is designed to go off before you feel sick, so you have time to react and take action.

Don't panic. Press the Mute Button to temporarily quiet the alarm, then call 911 or the Fire Department. Immediately move everyone to a source of fresh air. Moving outside is the safest solution.

Leave the CO alarm where it is (The emergency responders will want to check it when they arrive). Do not re-enter your home until the emergency responder has arrived, your home is aired out, and your CO alarm returns to normal operation.

Have the problem corrected as soon as possible. Keep your home well ventilated until the problem has been fixed.

**In some cases, problems can occur even if all appliances are working properly:**

- If appliances, flues and chimneys are confirmed to be in good working order, the source of carbon monoxide may be from backdrafting. This condition exists primarily in newer, more energy efficient, "airtight" homes. Flue gases normally vent to the outside through flues and chimneys. As temperatures drop at night, air pressure inside an airtight home may become lower than outside, causing flue gases that normally exit the house to turn around and flow back down the pipes.

- Inadequate air supply in a room where two or more combustion-driven appliances share the same air source, such as a water heater and furnace in a utility closet, can create a more complicated form of backdrafting called reverse stacking. This occurs when one appliance turns on, such as the furnace, and is unable to get adequate fresh air. When the furnace operates, it draws contaminated air from the water heater exhaust, and spreads polluted air throughout the house.

- A broken thermostat can keep the furnace running continuously, depleting the oxygen supply inside the house. This may lead to backdrafting.

- In multiple family dwellings like apartments or townhouses, where living spaces share walls and pipes, carbon monoxide from one unit may go into a neighboring space through floorboards, cracks, or underneath doors.

**How does a carbon monoxide alarm work?**

It's not like a smoke alarm. While a smoke alarm triggers an alarm when it detects particles of smoke, a carbon monoxide alarm triggers an alarm based on exposure to CO over time. It is designed to sound an alarm before an average, healthy adult would experience symptoms.

Remember, with carbon monoxide, it is the concentration of CO over time that poses a threat. Since carbon monoxide displaces oxygen in your blood, it can harm you if you are exposed to either high levels of CO in a short period of time, or to lower levels of CO over a longer period of time. Current UL limits for CO exposure are:

- 30ppm for 30 days
- 150ppm for 10-50 minutes
- 70ppm for 60-240 minutes
- 400ppm for 4-15 minutes

**If initial testing does not confirm the presence of carbon monoxide, there may be other reasons for an alarm:**

- Professional equipment used to measure the presence of carbon monoxide in the air must be calibrated to sense low levels of gas concentration. Some detection devices only measure concentrations of 1,000 parts per million and higher, significantly above safe levels.

- If initial readings don't reveal sufficient concentrations of carbon monoxide to set off the alarm, testing equipment which registers levels over a 24-hour period should be used to help identify the source.

- If doors or windows are left open or appliances turned off, and outside air enters the home, carbon monoxide can dissipate. This can create a lower reading than the original level that triggered the alarm.

- To help assure proper measurement, after evacuating the home, carbon monoxide readings should be conducted by professionals as quickly as possible after the alarm has sounded. To ensure the most accurate testing by professionals, leave doors and windows shut after evacuating.

**CAUTION:** Do not reenter the premises until the emergency services responder has arrived, the premises have been aired out and the CO alarm remains in its normal condition.