



US Consumer Product Safety Commission

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Consumer Product Safety Commission Carbon Monoxide Questions and Answers

CPSC Document #466

1. What is carbon monoxide (CO) and how is it produced?

Carbon monoxide (CO) is a deadly, colorless, odorless, poisonous gas. It is produced by the incomplete burning of various fuels, including coal, wood, charcoal, oil, kerosene, propane, and natural gas. Products and equipment powered by internal combustion engine-powered equipment such as portable generators, cars, lawn mowers, and power washers also produce CO.

2. How many people are unintentionally poisoned by CO?

On average, about 170 people in the United States die every year from CO produced by non-automotive consumer products. These products include malfunctioning fuel-burning appliances such as furnaces, ranges, water heaters and room heaters; engine-powered equipment such as portable generators; fireplaces; and charcoal that is burned in homes and other enclosed areas. In 2005 alone, CPSC staff is aware of at least 94 generator-related CO poisoning deaths. Forty-seven of these deaths were known to have occurred during power outages due to severe weather, including Hurricane Katrina. Still others die from CO produced by non-consumer products, such as cars left running in attached garages. The Centers for Disease Control and Prevention estimates that several thousand people go to hospital emergency rooms every year to be treated for CO poisoning.

3. What are the symptoms of CO poisoning?

Because CO is odorless, colorless, and otherwise undetectable to the human senses, people may not know that they are being exposed. The initial symptoms of low to moderate CO poisoning are similar to the flu (but without the fever). They include:

- o Headache
- o Fatigue
- o Shortness of breath
- o Nausea
- o Dizziness

High level CO poisoning results in progressively more severe symptoms, including:

- o Mental confusion
- o Vomiting
- o Loss of muscular coordination
- o Loss of consciousness
- o Ultimately death

Symptom severity is related to both the CO level and the duration of exposure. For slowly developing residential CO problems, occupants and/or physicians can mistake mild to moderate CO poisoning symptoms for the flu, which sometimes results in tragic deaths. For rapidly developing, high level CO exposures (e.g., associated with use of generators in residential spaces), victims can rapidly become mentally confused, and can lose muscle control without having first experienced milder symptoms; they will likely die if not rescued.

4. How can I prevent CO poisoning?

- Make sure appliances are installed and operated according to the manufacturer's instructions and local building codes. Most appliances should be installed by qualified professionals. Have the heating system professionally inspected and serviced annually to ensure proper operation. The inspector should also check chimneys and flues for blockages, corrosion, partial and complete disconnections, and loose connections.
- Never service fuel-burning appliances without proper knowledge, skill and tools. Always refer to the owners manual when performing minor adjustments or servicing fuel-burning equipment.
- Never operate a portable generator or any other gasoline engine-powered tool either in or near an enclosed space such as a garage, house, or other building. Even with open doors and windows, these spaces can trap CO and allow it to quickly build to lethal levels.
- Install a CO alarm that meets the requirements of the current UL 2034 or CSA 6.19 safety standards. A CO alarm can provide some added protection, but it is no substitute for proper use and upkeep of appliances that can produce CO. Install a CO alarm in the hallway near every separate sleeping area of the home. Make sure the alarm cannot be covered up by furniture or draperies.
- Never use portable fuel-burning camping equipment inside a home, garage, vehicle or tent unless it is specifically designed for use in an enclosed space and provides instructions for safe use in an enclosed area.
- Never burn charcoal inside a home, garage, vehicle, or tent.
- Never leave a car running in an attached garage, even with the garage door open.
- Never use gas appliances such as ranges, ovens, or clothes dryers to heat your home.
- Never operate unvented fuel-burning appliances in any room where people are sleeping.
- Do not cover the bottom of natural gas or propane ovens with aluminum foil. Doing so blocks the combustion air flow through the appliance and can produce CO.
- During home renovations, ensure that appliance vents and chimneys are not blocked by tarps or debris. Make sure appliances are in proper working order when renovations are complete.

5. What CO level is dangerous to my health?

The health effects of CO depend on the CO concentration and length of exposure, as well as each individual's health condition. CO concentration is measured in parts per million (ppm). Most people will not experience any symptoms from prolonged exposure to CO levels of approximately 1 to 70 ppm but some heart patients might experience an increase in chest pain. As CO levels increase and remain above 70 ppm, symptoms become more noticeable and can include headache, fatigue and nausea. At sustained CO concentrations above 150 to 200 ppm, disorientation, unconsciousness, and death are possible.

6. What should I do if I am experiencing symptoms of CO poisoning and do not have a CO alarm, or my CO alarm is not going off?

If you think you are experiencing any of the symptoms of CO poisoning, get outside to fresh air immediately. Leave the home and call your fire department to report your symptoms from a neighbor's home. You could lose consciousness and die if you stay in the home. It is also important to contact a doctor immediately for a proper diagnosis. Tell your doctor that you suspect CO poisoning is causing your problems. Prompt medical attention is important if you are experiencing any symptoms of CO poisoning. If the doctor confirms CO poisoning, make sure a qualified service person checks the appliances for proper operation before reusing them.

7. Are CO alarms reliable?

CO alarms always have been and still are designed to alarm before potentially life-threatening levels of CO are reached. The safety standards for CO alarms have been continually improved and currently marketed CO alarms are not as susceptible to nuisance alarms as earlier models.

8. How should a consumer test a CO alarm to make sure it is working?

Consumers should follow the manufacturer's instructions. Using a test button tests whether the circuitry is operating correctly, not the accuracy of the sensor. Alarms have a recommended replacement age, which can be obtained from the product literature or from the manufacturer.

9. How should I install a CO Alarm?

CO alarms should be installed according to the manufacturer's instructions. CPSC recommends that one CO alarm be installed in the hallway outside the bedrooms in each separate sleeping area of the home. CO alarms may be installed into a plug-in receptacle or high on the wall. Hard wired or plug-in CO alarms should have battery backup. Avoid locations that are near heating vents or that can be covered by furniture or draperies. CPSC does not recommend installing CO alarms in kitchens or above fuel-burning appliances.

10. What should you do when the CO alarm sounds?

Never ignore an alarming CO alarm! It is warning you of a potentially deadly hazard.

If the alarm signal sounds **do not try to find the source of the CO:**

- a. Immediately move outside to fresh air.
- b. Call your emergency services, fire department, or 911.
- c. After calling 911, do a head count to check that all persons are accounted for. DO NOT reenter the premises until the emergency services responders have given you permission. You could lose consciousness and die if you go in the home.
- d. If the source of the CO is determined to be a malfunctioning appliance, DO NOT operate that appliance until it has been properly serviced by trained personnel.

If authorities allow you to return to your home, and your alarm reactivates within a 24 hour period, repeat steps 1, 2 and 3 and call a qualified appliance technician to investigate for sources of CO from all fuel burning equipment and appliances, and inspect for proper operation of this equipment. If problems are identified during this inspection, have the equipment serviced immediately. Note any combustion equipment not inspected by the technician and consult the manufacturers' instructions, or contact the manufacturers directly, for more information about CO safety and this equipment. Make sure that motor vehicles are not, and have not been, operating in an attached garage or adjacent to the residence.

11. What is the role of the U.S. Consumer Product Safety Commission (CPSC) in preventing CO

poisoning?

CPSC staff worked closely with Underwriters Laboratories (UL) to help develop the safety standard (UL 2034) for CO alarms. CPSC helps promote carbon monoxide safety by raising awareness of CO hazards and the need for correct use and regular maintenance of fuel-burning appliances. CPSC staff also works with stakeholders to develop voluntary and mandatory standards for fuel-burning appliances and conducts independent research into CO alarm performance under likely home-use conditions.

12. Do some cities require that CO alarms be installed?

Many states and local jurisdictions now require CO alarms be installed in residences. Check with your local building code official to find out about the requirements in your location.

13. Should CO alarms be used in motor homes and other recreational vehicles?

CO alarms are available for boats and recreational vehicles and should be used. The Recreation Vehicle Industry Association requires CO alarms in motor homes and in towable recreational vehicles that have a generator or are prepped for a generator.

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The U.S. Consumer Product Safety Commission is charged with protecting the public from unreasonable risks of serious injury or death from thousands of types of consumer products under the agency's jurisdiction. The CPSC is committed to protecting consumers and families from products that pose a fire, electrical, chemical, or mechanical hazard. The CPSC's work to ensure the safety of consumer products - such as toys, cribs, power tools, cigarette lighters, and household chemicals - contributed significantly to the decline in the rate of deaths and injuries associated with consumer products over the past 30 years.

To report a dangerous product or a product-related injury, call CPSC's hotline at (800) 638-2772 or CPSC's teletypewriter at (301) 595-7054, or visit CPSC's web site at www.cpsc.gov/talk.html. To join a CPSC email subscription list, please go to <https://www.cpsc.gov/cpsclist.aspx>. Consumers can obtain this release and recall information at CPSC's Web site at www.cpsc.gov.



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Protect Your Family and Yourself from Carbon Monoxide Poisoning

Carbon Monoxide Can Be Deadly

You can't see or smell carbon monoxide, but at high levels it can kill a person in minutes. Carbon monoxide (CO) is produced whenever any fuel such as gas, oil, kerosene, wood, or charcoal is burned. If appliances that burn fuel are maintained and used properly, the amount of CO produced is usually not hazardous. However, if appliances are not working properly or are used incorrectly, dangerous levels of CO can result. Hundreds of people die accidentally every year from CO poisoning caused by malfunctioning or improperly used fuel-burning appliances. Even more die from CO produced by idling cars. Fetuses, infants, elderly people, and people with anemia or with a history of heart or respiratory disease can be especially susceptible. Be safe. Practice the DO's and DON'Ts of carbon monoxide.

CO Poisoning Symptoms

Know the symptoms of CO poisoning. At moderate levels, you or your family can get severe headaches, become dizzy, mentally confused, nauseated, or faint. You can even die if these levels persist for a long time. Low levels can cause shortness of breath, mild nausea, and mild headaches, and may have longer-term effects on your health. Since many of these symptoms are similar to those of the flu, food poisoning, or other illnesses, you may not think that CO poisoning could be the cause.

Play it Safe

If you experience symptoms that you think could be from CO poisoning:

- ✓ **DO GET FRESH AIR IMMEDIATELY.** Open doors and windows, turn off combustion appliances and **leave the house.**
- ✓ **DO GO TO AN EMERGENCY ROOM** and tell the physician you suspect CO poisoning. If CO poisoning has occurred, it can often be diagnosed by a blood test done soon after exposure.
- ✓ **DO** Be prepared to answer the following questions for the doctor:
 - Do your symptoms occur only in the house? Do they disappear or decrease when you leave home and reappear when you return?
 - Is anyone else in your household complaining of similar symptoms? Did everyone's symptoms appear about the same time?
 - Are you using any fuel-burning appliances in the home?
 - Has anyone inspected your appliances lately? Are you certain they are working properly?

Prevention is the Key to Avoiding Carbon Monoxide Poisoning

- ✓ **DO** have your fuel-burning appliances -- including oil and gas furnaces, gas water heaters, gas ranges and ovens, gas dryers, gas or kerosene space heaters, fireplaces, and wood stoves -- inspected by a trained professional at the beginning of every heating

season. Make certain that the flues and chimneys are connected, in good condition, and not blocked.

- ✓ **DO** choose appliances that vent their fumes to the outside whenever possible, have them properly installed, and maintain them according to manufacturers' instructions.
- ✓ **DO** read and follow all of the instructions that accompany any fuel-burning device. If you cannot avoid using an unvented gas or kerosene space heater, *carefully follow the cautions* that come with the device. Use the proper fuel and keep doors to the rest of the house open. Crack a window to ensure enough air for ventilation and proper fuel-burning.
- ✓ **DO** call EPA's IAQ INFO Clearinghouse (1-800-438-4318) or the Consumer Product Safety Commission (1-800-638-2772) for more information on how to reduce your risks from CO and other combustion gases and particles.
- ✗ **DON'T** idle the car in a garage -- even if the garage door to the outside is open. Fumes can build up very quickly in the garage and living area of your home.
- ✗ **DON'T** use a gas oven to heat your home, even for a short time.
- ✗ **DON'T ever** use a charcoal grill indoors -- even in a fireplace.
- ✗ **DON'T** sleep in any room with an unvented gas or kerosene space heater.
- ✗ **DON'T** use any gasoline-powered engines (mowers, weed trimmers, snow blowers, chain saws, small engines or generators) in enclosed spaces.
- ✗ **DON'T** ignore symptoms, particularly if more than one person is feeling them. You could lose consciousness and die if you do nothing.

A Few Words About CO Detectors

Carbon Monoxide Detectors are widely available in stores and you may want to consider buying one as a back up -- *BUT NOT AS A REPLACEMENT* for proper use and maintenance of your fuel-burning appliances. However, it is important for you to know that the technology of CO detectors is still developing, that there are several types on the market, and that they are not generally considered to be as reliable as the smoke detectors found in homes today. Some CO detectors have been laboratory-tested, and their performance varied. Some performed well, others failed to alarm even at very high CO levels, and still others alarmed even at very low levels that don't pose any immediate health risk. And unlike a smoke detector, where you can easily confirm the cause of the alarm, CO is invisible and odorless, so it's harder to tell if an alarm is false or a real emergency.

So What's a Consumer to Do?

First, don't let buying a CO detector lull you into a false sense of security. Preventing CO from becoming a problem in your home is better than relying on an alarm. Follow the checklist of DOs and DON'Ts above.

Second, if you shop for a CO detector, do some research on features and don't select solely on the basis of cost. Non-governmental organizations such as Consumers Union (publisher of *Consumer Reports*), the American Gas Association, and Underwriters Laboratories (UL) can help you make an informed decision. Look for UL certification on any detector you purchase.

Carefully follow manufacturers' instructions for its placement, use, and maintenance.

If the CO detector alarm goes off:

- Make sure it is your CO detector and not your smoke detector.
- Check to see if any member of the household is experiencing symptoms of poisoning.
- If they are, get them out of the house immediately and seek medical attention. Tell the doctor that you suspect CO poisoning.
- If no one is feeling symptoms, ventilate the home with fresh air, turn off all potential sources of CO -- your oil or gas furnace, gas water heater, gas range and oven, gas dryer, gas or kerosene space heater and any vehicle or small engine.
- Have a qualified technician inspect your fuel-burning appliances and chimneys to make sure they are operating correctly and that there is nothing blocking the fumes from being vented out of the house.