



# PROTECT YOUR FAMILY FROM CARBON MONOXIDE POISONING

Every year, several hundred Americans die from carbon monoxide poisoning. Thousands are treated for the illness in emergency rooms, and many thousands more are poisoned, but undiagnosed. The purpose of this publication is to help prevent carbon monoxide poisoning by alerting people to the source of the problem, helping them recognize the symptoms, and teaching them how to reduce their risk.

## What is carbon monoxide?

Carbon monoxide is a colorless, odorless, toxic gas. There is no way for humans to detect its presence, because it does not irritate the nose, eyes, or skin. It is a product of incomplete combustion. This means that burning any type of fuel — gas, oil, charcoal, coal, or wood — can produce carbon monoxide when conditions are right. Potential sources inside the home are gas or oil furnaces and water heaters; gas ranges, dryers, and refrigerators; fireplaces and wood-burning stoves; and kerosene or gas space heaters. Cigarette smoking also produces carbon monoxide, and the gas can enter the home from sources in the garage or near the house: car exhausts, snowblowers, lawnmowers, and other small gasoline engines. Electric appliances do not generate carbon monoxide.

## How is carbon monoxide harmful?

Carbon monoxide is poisonous. When it is breathed, it replaces oxygen in the blood, where it can rise to toxic levels. Carbon monoxide poisoning can be difficult to diagnose, because the early symptoms mimic flu without the fever — headache, nausea, dizziness, fatigue, and sleepiness. High levels of carbon monoxide can produce disorientation and unconsciousness. At very high levels, death occurs.

Symptoms should not be ignored. If individuals experience symptoms of carbon monoxide poisoning, they

should turn off heating and combustion appliances, open doors and windows for ventilation, leave the building, and seek medical assistance. In severe cases, affected individuals may need to go to an emergency room for oxygen to purge the carbon monoxide from their bodies. Smokers, individuals with heart disease, elderly persons, fetuses, and infants are at highest risk.

## How can we reduce the risk of poisoning?

Any combustion appliances operating in the home or an attached garage can place residents at risk of carbon monoxide poisoning. Appliances should be maintained regularly and operated properly to reduce risks.

## Furnaces and water heaters

Gas furnaces and water heaters should be inspected by a service contractor each year to make sure the gas burner is operating correctly. The pressure valve should be checked to ensure that the right proportions of gas and oxygen combine for complete combustion. The furnace or water heater requires an adequate supply of air for complete combustion and to prevent backdrafting. Sealed-combustion, direct-vent heating systems reduce risks, because they provide air directly to the burner and do not rely on air from the house for oxygen. The furnace heat exchanger should be examined to ensure that there are no cracks or rust that would allow flue gases to enter the heating system. There should be no corrosion around the burner, and the vent or chimney should exhaust flue gases outside the house. The chimney should be checked to ensure that there is no blockage and masonry has not deteriorated. Vent pipes should be tight-fitting and free of cracks. If there are soot deposits in the house or condensation on windows, or if the furnace runs excessively, a heating contractor or appliance service technician should check for a problem with combustion appliances.

## Gas ranges

Unlike gas water heaters and furnaces, gas ranges do not have a vent or chimney to exhaust the combustion products to the outside. It is a good practice to run the range hood fan when using a gas range, either the stove top or the oven, to exhaust the flue gases to the outside. The exhaust fan should vent to the outside and not into the attic or a crawlspace. If the flame in any of the burners is not a blue color, an appliance service technician should check and adjust the unit. Never use a gas range to heat the house or kitchen.

## Gas dryers

All dryers, whether gas or electric, should be vented to the outside, not back into the house, attic, or crawl space. Check to make sure that the hose leading to the outside vent is not clogged with lint and that the vent flap on the outside of the house opens when the dryer is running. Vents can freeze shut during very cold weather, and exhaust fumes cannot escape.

## Fireplaces and wood-burning stoves

Burning wood produces large amounts of carbon monoxide. Chimneys should be inspected and cleaned regularly so the combustion products exhaust to the outside. Make sure the damper is open before starting a fire.

## Unvented gas and kerosene space heaters

Non-electric space heaters not vented to the outside are dangerous in enclosed spaces, because all combustion products remain in the heated space. Such heaters should not be used in enclosed spaces except in emergencies, such as a power outage in the winter, and even then should not be used to heat a space where people are sleeping. If heaters are used during emergencies, doors and windows should be opened often to ventilate the area. The heaters should not be used to heat garages or basements unless there is plenty of ventilation.

## Does carbon monoxide enter the house from an attached garage?

Even with the garage door open, carbon monoxide levels can reach toxic levels if cars or other gas engines are allowed to run in an attached garage. The carbon monoxide generated mixes with air and moves freely into other spaces. An attached garage cannot be sealed well enough to prevent carbon monoxide from entering the house. If heating ducts or return air ducts run through the garage, they can be pathways for carbon monoxide to move into the house.

In the winter, starting a car produces large amounts of carbon monoxide for a few minutes. After the car warms up, less is produced. A car should never be left to run in the garage. Lawnmowers, snowblowers, and other gasoline engines should not be run in a garage or other enclosed space. They produce significant amounts of carbon monoxide, as do charcoal or gas grills.

## Do carbon monoxide detectors work?

Carbon monoxide detectors have been on the market for several years. As the technology improves, the reliability of detectors also improves. Detectors with the best reliability are those that meet a 1998 standard from Underwriters Laboratory (UL) as well as the standard from the International Approval Service (IAS). When purchasing a carbon monoxide detector, consumers should look for one labeled UL 2034-98 (an indication that it meets the 1998 UL standard) or labeled IAS 6-96. Few companies currently market detectors that meet these standards.

Detectors contain an alarm that sounds when carbon monoxide levels become dangerous. Low levels of carbon monoxide can be present for a short time without triggering the alarm. The alarm should be taken seriously. Combustion appliances should be turned off and doors and windows opened for ventilation. If residents experience symptoms associated with poisoning, the house should be vacated.

To check the house and identify the source of carbon monoxide, call a heating contractor, an appliance service technician, the fire department, or the gas company.

Ask for a technician who has experience in testing homes for carbon monoxide and who can help identify the source. Often, the house has been ventilated when the service technician arrives, and the conditions that caused the alarm to sound no longer exist. An experienced technician will know how to identify the source of the problem. If the technician cannot find the problem, call another one. Do not ignore the warning.

There are both 110-volt AC (plug-in and hard-wired) detectors and battery-powered detectors. The AC-powered detectors have the advantage of not being dependant on batteries being replaced regularly, whereas the battery-powered detectors have the advantage of being operational during a power outage. If you experience frequent power outages (and especially if you use an unvented gas or kerosene heater during these outages), a battery-operated unit should be used. Some AC-powered detectors have a battery backup that combines the advantages of each.

### Where should a detector be installed?

The Consumer Product Safety Commission recommends placing at least one detector in the sleeping area of every house. If just one detector is installed, it should be located so it can be heard in every bedroom. If there are bedrooms on several levels, install several detectors. Because carbon monoxide mixes with air, detectors can be installed either high or low on a wall or on a ceiling. They should not be installed in the kitchen, furnace room, garage, or in a very humid environment, such as the bathroom. Do not install near stored chemicals or near combustion appliances. Follow the manufacturer's instructions for installation. Carbon monoxide detectors are required in recreational vehicles.

### Summary

- Install a carbon monoxide detector near sleeping rooms in your house. Test it regularly to assure that it is working properly.
- Have a qualified service technician check all combustion appliances in the home annually.
- Call a service technician if you notice any problems with combustion appliances, if there are soot deposits in the house or condensation on the windows, or if the furnace runs excessively.
- Do not use unvented combustion appliances to heat the house.
- Do not use charcoal grills inside a house, garage, recreational vehicle, or tent.
- Do not run the car or other gas engines in the garage.
- Leave the house if you or other family members experience symptoms of carbon monoxide poisoning. Seek medical assistance immediately.
- Respond to a carbon monoxide detector alarm by turning off combustion appliances, ventilating the house, leaving the house if residents have symptoms of poisoning, and calling a qualified service technician to find the problem.

### Sources:

Iowa State University Cooperative Extension

Web site:

[http://www.ae.iastate.edu/human\\_housing.htm](http://www.ae.iastate.edu/human_housing.htm)

American Industrial Hygiene Association Web site:

<http://www.aiha.org/pr/carbon.html>

Consumer Product Safety Commission, *Carbon Monoxide Fact Sheet* #466.

U.S. Environmental Protection Agency, *Protect Your Family and Yourself from Carbon Monoxide Poisoning*.

**Written by Marilyn Bode, Extension Housing Specialist, and reviewed by Nick Huser and Bruce Snead, K-State extension specialists.**

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Marilyn Bode, "Protect Your Family From Carbon Monoxide Poisoning," Kansas State University, June 1999.

---

**Kansas State University Agricultural Experiment Station and Cooperative Extension Service**

MF-2393

June 1999

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.