What Is Carbon Monoxide?

Carbon monoxide is colorless, odorless, tasteless toxic gas produced as a byproduct of combustion. Any fuel burning appliance, vehicle, tool or device has the potential to produce dangerous levels of carbon monoxide gas. Examples of Carbon Monoxide (CO) Producing Devices Common to the Home Environment:

- Fuel Fired Furnaces (non-electric)
- Gas Water Heaters
- Fireplaces and Woodstoves
- Gas Stoves
- Gas Dryers
- Charcoal Grills
- Lawnmowers, snow blowers and other yard equipment
- Automobiles

How Can I Tell if There is a Carbon Monoxide Leak in my Home*?*

Personal

- Headache, nausea, burning eyes, fainting, confusion, drowsiness
- Often mistaken for common ailments like the flu
- Symptoms improve when away from the home for a period of time
- Symptoms experienced by more than one member of the household
- Continued exposure to higher levels may result in unconscious, brain damage and death
- The elderly, children and people with heart or respiratory conditions may be particularly sensitive to carbon monoxide

Environment

- Air feels stale/stuffy
- Excessive moisture on windows or walls
- Sharp penetrating odor or smell of gas when furnace or other fuel burning appliance turns on

- Burner and pilot light flames are yellow/orange, not blue
- Pilot light on the furnace or water heater goes out
- Chalky white powder or soot buildup occurs around exhaust vent or chimney

Why Do I Need A Carbon Monoxide Detector?

The Consumer Products Safety Commission (CPSC) reports that approximately 200 people per year are killed by accidental CO poisoning, with an additional 5000 people injured. These deaths and injuries are typically caused by improperly used or malfunctioning equipment aggravated by improvements in building construction, which limit the amount of fresh air flowing into home and other structures.

Regular maintenance and inspection of gas burning equipment in the home is essential. Regular maintenance will minimize the possibility for some type of sudden failure resulting in a potentially life threatening build up of carbon monoxide gas.

Physiology of Carbon Monoxide Exposure:

Carbon Monoxide inhibits the blood's ability to carry oxygen to body tissues and vital organs such as the heart and brain. When CO is inhaled, it combines with the oxygen carrying hemoglobin of the blood to form carboxyhemoglobin. Once this combination occurs, that hemoglobin is no longer available for transporting oxygen. How quickly the carboxyhemoglobin builds up relates to the concentration of CO in the air, or Parts Per Million, and the duration of the exposure.

Compounding the effects of the exposure is the long half-life of carboxyhemoglobin, or in other words, the amount of time necessary for levels of carboxyhemoglobin to return to normal.

The half-life of carboxyhemoglobin is approximately 5 hours. For example: After a carbon monoxide exposure that creates a level of 30% COHb, it will take five hours for the level of carboxyhemoglobin in the blood to reduce to 15% COHb, once the exposure is terminated.

Types of Carbon Monoxide Detectors:

At present, three technologies are used in the manufacture of carbon monoxide alarms:

Biomimetic Sensor

Biomimetic means, "to mimic Life". A disk of molecularly engineered hemoglobin is placed inside the detectors sensing chamber. This disk is engineered to form a molecular keyhole that only CO can fit into. As carbon monoxide attaches itself to the artificial hemoglobin, the disk darkens. A light emitting diode (LED) monitors the degree of optical change. When the concentration of CO reaches the activation threshold, the alarm sounds.

Note — For these sensors to function properly, they must be allowed to "reset" after an alarm by removing the unit and placing it in a clean air environment for several hours. The COHb level will reduce, just as it does in the human body.

Semiconductor Based

Uses an electrically powered sensing element monitored by an integrated circuit or computer chip. The sensing element is a thin layer of tin dioxide placed over a ceramic base. Wires on the same conduit are embedded into the ceramic base, forming an open circuit because the ceramic base does not conduct electricity. The surface of the electrical charged tin dioxide attracts both oxygen and carbon monoxide. Oxygen restricts the flow of electrons, increasing the resistance between the wires. Carbon monoxide increases the flow of electrons; resistance between the wires is decreased. This detector works in 2.5-minute cycles, monitoring air quality and burning off the last cycle's sample. The microchip records each sampling and will cause the detector to sound an alarm when levels of CO are continually above the allowed threshold.

Safe Air Sentry

Uses Fuel Cell Electrical-chemical sensors. This allows for an instant detection and response. In the event of a carbon monoxide level that is above the alarm threshold, the detector immediately sounds an alarm. This type of sensing element also contains a memory for peak carbon monoxide levels, further aiding responders in the detection of the carbon monoxide.

Number of Detectors and Placement:

The Consumer Product Safety Commission recommends a detector on each floor of a residence. At a minimum, a single detector should be place on each sleeping floor with an additional detector in the area of any major gas burning appliances.

Installation next to major appliances will ensure rapid detection of life-threatening levels of CO gas. Installation next to sleeping areas will ensure hearing the alarm during sleep.

Carbon monoxide detectors should be placed high, near the ceiling, for most effective use. Detectors should not be placed within five feet of gas-fueled appliances or near cooking or bathing areas.

Consult the manufacturer's installation instructions for proper placement of a detector with in a given area.

Common Causes of Carbon Monoxide Alarms:

Many conditions can cause a carbon monoxide detector to alarm. Most are preventable, and few are actually life threatening. Proper placement of a detector and educated users will prevent notification to emergency services unnecessarily. Some common causes of alarms are as follows:

- Inadequate ventilation of the home
- Improve the fresh air ventilation system of the home
- Running gas powered equipment or automobiles in a home or garage
- Never operate gas-powered equipment in a home or garage — even if the garage door is open. The atmosphere of the home is usually at a lower pressure than the outside air, the gas is actually drawn in to the home.
- Charcoal grilling in the home or garage

- Charcoal is a tremendous producer of CO gas. Never grill with charcoal inside the home or garage
- Malfunctioning appliances or equipment in the home
- All fuel-burning appliances require periodic inspection and maintenance. All fuel burning appliances will produce some CO gas, however regular maintenance can keep this to a minimum
- Malfunctioning or overly sensitive alarm
- Make sure the CO alarm is listed by UL standard 2034. (Adopted in 1995)
- Maintain the detector to the manufacturer's standards
- Certain types are somewhat less reliable

What Do I Do If My CO Detector Sounds An Alarm:

- First and foremost, stay calm. Many situations resulting in an alarm are not life threatening. To be on the safe side, do the following:
- Evacuate the residence as quickly as possible.
- Do not open windows and doors to ventilate the building! Ventilation will make it very difficult for responders to locate the source of the alarm
- Go to a neighbor's home and call 911 if there are sick/injured family members.
- Does anyone feel ill?
- Flu like symptoms
- Nausea
- Dizziness
- Wait for the fire department/ambulance to arrive. DO NOT go back inside the building until it has been checked, and determined safe to occupy.
- If you must wait in a vehicle due to cold weather, pull the vehicle away from the home or garage. Vehicles left inside a garage will contribute to the problem.