

DON'T LET THIS BE YOUR CARBON MONOXIDE ALARM!



**RAISING AWARENESS AND SAVING LIVES
Everyday is a carbon monoxide safety day!**

**Learn about the hazards of carbon monoxide and poisoning!
Every home & building should have a carbon monoxide alarm!**

COSA

Carbon Monoxide Safety Association

www.cosafety.org



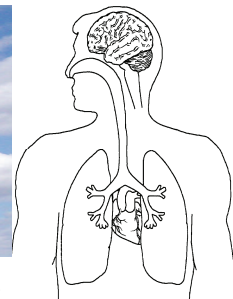
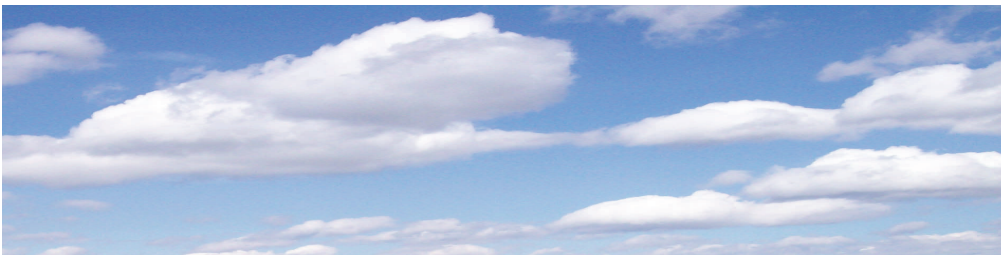
Poisoning from carbon monoxide (referenced by the chemical symbol CO) can go undetected though a person might be experiencing symptoms everyday. We are not all of equal health so it is vital we all have gainful knowledge about what CO is, how it is formed, how it gets to where it is breathed in and how we can reduce exposures. **CO can come from common unburned hydrocarbon fuels** (referenced by the chemical symbols C & H). These fuels include gasoline, natural gas, heating oil, propane, wood, charcoal and similarly familiar products.

Carbon monoxide is a poison.

It is often referenced as “The Silent killer” in that CO is odorless, tasteless and invisible. It is very important to know that some common odors also contain harmful or deadly levels of carbon monoxide. These odors may be around us everyday and because of their commonality might be why they are often overlooked as hazardous or the contributing factor to some everyday illness symptoms.

It is of primary importance that the health symptoms and the effects of CO poisoning are clearly understood, recognized, tested for, and remediated. Carbon monoxide at high concentrations is a deadly poison and in lesser concentrations can cause illness symptoms for all people especially those who have vulnerable health issues. This booklet contains general information specific to carbon monoxide and suggestions for detection and prevention. Everyone is vulnerable to CO poisoning.

How does Carbon Monoxide harm you? Quite simply, carbon monoxide prevents oxygen from being used by your body. Every part of our body needs oxygen. Air is made up of approximately 20.9% oxygen and 79% nitrogen. The hemoglobin within our blood carries oxygen to every cell in our body. With a good diet, fresh air and working parts, a human has an ability to maintain equilibrium and a healthy metabolism.



If harmful amounts of carbon monoxide are in the air you breathe it takes the place of oxygen as it transfers to the blood through the respiratory system. This displacement of oxygen in your blood begins a process that generates a free radical or a disassociated molecule reaction. At lower poisonous levels the symptoms are slower reaction time, weak muscular movement & dexterity, hampered visual focus, headache or nausea and may be immediate symptoms or poisonous enough to cause heart stresses in compensation for the loss of oxygen. CO poisoning has the potential of harming your central nervous system because of the disruption of oxygen delivery.

When carbon monoxide is inhaled into the lungs and bonds with hemoglobin in blood, it forms *Carboxyhemoglobin (COHb)*. This displacement of oxygen in the blood stream will affect all major organs and muscles.

Always pay attention to the air you breathe.

Carbon monoxide has many everyday sources.



Remember CO is odorless, however it can be present within the common everyday “smells” of combustion & exhaust systems. For instance automotive exhaust from a vehicle left running in a garage is an especially dangerous practice and is even more dangerous if the garage is attached to a house, apartment or any building.

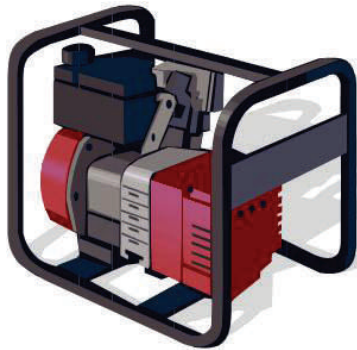
People have been sickened or died while keeping their vehicles running while talking, sleeping or romantically occupied. Factors that contribute to this type of poisoning are as simple as prevailing winds bringing exhaust into the vehicle or deep snow, mud, ditches and walls restricting the safe exhaust away from the vehicle.

You may be exposed to CO poisoning when you burn charcoal, lamp oil, alcohol or camping gas in an enclosed tent, camper or room. You may also be exposed to CO when there is cigar, cigarette or pipe tobacco smoke. Garbage, leaf, brush or forest fires also can produce sickening to deadly levels of carbon monoxide.

Combustion gas from propane fueled forklifts, floor buffers & power washers can also contain poisonous levels of carbon monoxide.

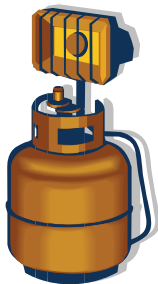


Your home or building may contain malfunctioning oil, gas or wood furnaces, water heaters, space heaters, cooking systems or fireplaces that are already producing large amounts of CO.



The misuse of gasoline powered electric generators is resulting in the death & injury to people at work and during power outages. Use them cautiously, safely and far away from buildings, campers & your air. Never use outdoor barbecue's inside. Never use gas or gasoline powered tools inside. Be careful with unvented portable heaters.

DO NOT USE UNVENTED SYSTEMS INDOORS FOR EMERGENCY HEAT!



A carbon monoxide alarm/detector should be used whenever a combustion system is used. The choice of alarms, detectors and monitors may be a matter of life, better health or death. Your awareness is a matter of life or death!

There are approximately 50,000 Emergency Room visits for CO poisoning in the USA annually. More and more states and communities are requiring carbon monoxide alarms in living quarters, including motels. Though many of these laws are limited in their protective scope, they are a start at society recognizing a method to encourage safe practices to the silent killer. Many of these laws are named with recognition to children and other loved one's who have died from carbon monoxide.

Every day of the year CO news reports from around the world underline the prevalence and common occurrences of accidental poisonings. Often these deaths and illnesses could have been prevented if the people affected were more aware or better educated in the realities of this deadly gas. Perhaps if the building had a carbon monoxide alarm the injury could have been avoided.

How much CO is too much?

The health effects can vary significantly due to age, sex, weight and overall state of health. CO is measured in Parts per Million or PPM; out of a million molecules of air, how many are carbon monoxide. The time given respective to the levels referenced in this chart, are for healthy people unless otherwise stated.

12,000 PPM	Death within 1 – 3 minutes
1,600 PPM	Nausea within 20 minutes, death within 1 hour
800 PPM	Nausea and convulsions – death within 2 hours
400 PPM	Frontal headaches within 1-2 hours; life threatening within 3 hours; UL 2034 alarms should sound within 4 and 15 minutes.
200 PPM	NIOSH (National Institute for Occupational Safety & Health Administration) A worker will not be exposed to more than this amount.
150 PPM	UL 2034 Listed alarms must respond within a range of 10 to 50 minutes if this concentration or higher is present.
70 PPM	If CO at this level for 50 minutes up to 4 hours, UL 2034 alarm should be sounding.
50 PPM	Maximum average level for continuous exposure in an 8 hour workday per federal law.
35 PPM	8 hour exposure TWA (time weighted average); NIOSHA (National Institute of Occupational Safety and Health Administration) of the CDC (Center for Disease Control).
10-35 PPM	Marginal - Small children, elderly, and those suffering respiratory or heart problems are cautioned if these are chronic exposures concentrations. May increase heart stresses.
25 PPM	8 hour TWA limit; ACGIH (American Conference Of Governmental Industrial Hygienists)
9 PPM	This concentration is often measured around busy city streets & intersections.
1-9 PPM	It may be difficult to avoid those often occurring spikes in transient or chronic CO levels without life-style changes.

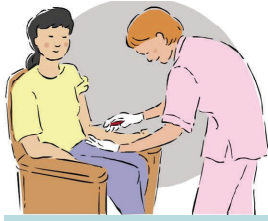
What are the symptoms of CO poisoning? Consult with your physician!

Carbon monoxide poisoning mimics many common illnesses, such as the flu and food poisoning. The following is a list of common symptoms.

- headaches
- loss of hearing
- dizziness
- depression
- blurry vision
- cardiac arrest
- disorientation
- respiratory failure
- weakness
- vomiting
- coma
- painful discomfort
- loss of consciousness
- muscle aches & soreness
- memory disorders
- seizures
- nausea
- rapid heartbeat

This list is not meant to serve as a diagnosis of carbon monoxide poisoning. It is meant to provide general information on poisoning symptoms. Oxidative stress causes a chain reaction in the body due to the interruption of oxygen intake.

Carbon monoxide poisoning is best treated with supplemental oxygen or pressurized oxygen in a hyperbaric chamber where CO is forced out of the hemoglobin of the blood. The longer CO stays in the body, the more disruption in body functions and symptoms are likely.



Traditional testing for carbon monoxide required a blood sample and might be a reason why low level symptoms were ignored.

Non-invasive testing is quick, painless and accurate; as simple as testing the end of your finger with a spot test. Ask your doctor.



The human body naturally produces some carbon monoxide endogenously or from within.

Carbon monoxide measured in the blood determines the per cent of CO in the hemoglobin of your blood. This measurement gives the caregiver a carboxyhemoglobin % (COHb%). Normal COHb% levels with non-smokers are in the 1-3% COHb range. Smokers can be in the 1-15% range, depending upon how much they smoke. Ask your doctor to give you a baseline COHb% test.



Most people don't think of themselves as combustion systems, but they are. Air is approximately 20.9% oxygen and almost 79% nitrogen. The food we eat and drink is made of predominantly hydrogen, carbon & proteins. When we mix the oxygen, nitrogen, carbon, hydrogen & proteins into our system we generate heat & energy and exhaust gases, similar to an oil burning combustion system. Since humans are not perfect combustion systems, some levels of CO are produced. 1 to 3% COHb is often referenced as "normal". Baseline & periodic testing can verify "normal". Normal is specific to measured levels outside in air in PPM and in blood by % when exogenous (outside) sources are limited.

Do you know someone who doesn't test the air they work in?

Every technician entering a building should **recognize health symptoms associated with carbon monoxide exposures**. They should also be aware that if they are not monitoring the CO levels they are working in, their own safety may be in jeopardy. What's the value in not testing?

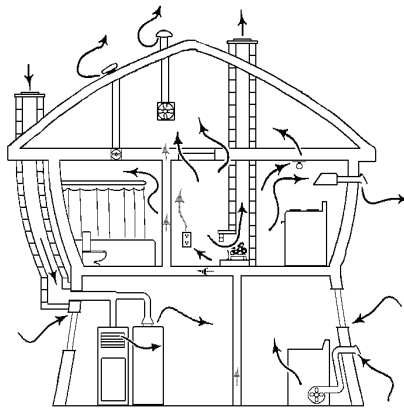
Who is responsible for the air you breathe? The health effects of CO poisoning are related to the concentration, length of exposure and overall health of the victim.

Some workplace environments have more exposure to CO than others. New studies indicate that chronic, low level exposure can have serious health consequences and may be misdiagnosed. These may be nagging symptoms which are often self-treated with medication and might be masking more serious problems. Get tested for CO; If you don't test for it, you won't know! The test is simple. If you have a symptom, test! It is your health that is at stake.



After a known carbon monoxide poisoning has occurred it is sometimes difficult to determine the source. The source may no longer be in the building. The buildings may have been tightened & ventilation systems put on timers to save energy. These measures can trap pollutants inside for long periods of time after the completion of the task. The fuel powered buffers, pressure washers or delivery systems may have been taken or put away after their use.

Buildings operate like chimneys. The buildings we live and work in also have currents of air and air pressure in them that could cause occasional generation and dispersion of CO from appliance chimney reversals. A building pressure test verifies the condition.



Building Stack Effect

Warmer, less dense air rises in the structure. Air leaks out of the holes near the top of the structure (exfiltration) and leaks into the holes near the bottom of the structure (infiltration). This driving force is sufficient to back-draft combustion equipment and distribute combustion gases. The building may be leaky!

When exhaust fans (bathroom, kitchen, clothes dryer, attic fans) **operate** they may exceed some gas, oil or wood furnace or water heater's draft pressure and result in combustion gas dispersion and perhaps carbon monoxide exposures & poisoning inside the home or building. Have your home pressure tested when your appliances are tested.

What can I do to protect myself and my family? This booklet contains many cautions.

It is highly recommended that unvented combustion systems be used with caution and with carbon monoxide and perhaps CO₂ (carbon dioxide) monitors to ensure healthy air. **Don't start** and leave running cars, generators, trucks, or other vehicles in an enclosed area especially the garage. Even with the big doors open it can still be dangerous. CO can also get into rooms above! Keep generators far away from windows, doors and other entries into buildings.

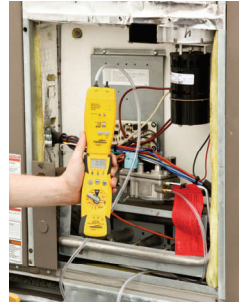
Every home should have at least one carbon monoxide detector that is more sensitive to the health needs of vulnerable populations. It is very important to know that **CO Alarms Listed by the UL 2034 Standards may not be the best** for some people of vulnerable health. They are not required to sound off until 70 PPM of CO is present for as long as 4 hours. They do not meet OSHA workplace standards for alarming. **The test button does not tell you the sensor works, just that the audible sound works.** U.L. requires listed alarms to notify consumers by product package instructions that suggest people of vulnerable health use a better alarm than that listed as U.L. 2034. COSA describes these people to include: pregnant women, infants and people with heart or respiratory complications, chronic depression or similar symptoms described in this brochure.

Gas & oil furnaces and water heaters and fireplace chimneys can get blocked by snow, bird nests or accidental clogging and can result in carbon monoxide production and eventual poisoning.

Have your furnace and other fuel burning appliances tested and inspected by a qualified professional once a year or before each heating season to each manufacturer's measurable standards found in the instructions. **You should receive a measurement report verifying what tests were taken and the results.** A certified professional should have a variety of certifications and continuing education credentials available for consumer viewing. The real certification is in the work performed that is verified and documented. Don't assume classroom certifications achieved by heating contractors equal work performed. The technicians still has to do the work & conduct the tests. If they don't or can't, don't pay for the service. Find out what tests will be performed before you schedule service.

Don't wait until illness symptoms occur or until something breaks! Have your appliances checked at least annually. Get a baseline on your house and your family. BE SAFE! If you are sick, go to the doctor and get tested.

Without testing, it is only guessing!



Make sure your service professional tests each appliance using a testing instrument that can detect carbon monoxide or analyze the combustion gases. **Today's HVAC technician** should also be able to measure building, duct and fuel pressures; this information may aid in the prevention of combustion system failure and CO generation. If you have symptoms described as carbon monoxide poisoning, seek medical testing!

Supporting Carbon Monoxide
Safety Education



COSA is fortunate to have the opportunities to work with manufacturers of test instruments and warning devices, HVAC business owners and their technicians, fuel suppliers, home inspectors and energy auditors, furnace and appliance manufacturers, educators, emergency responders, physicians and health technicians, building managers and consumers. **COSA** instructors conduct technical seminars and work with all services and communities to better understand carbon monoxide and the prevention of poisoning through preventative practices.

Safety Through Awareness, Training and Testing

Visit www.cosafety.org for more information about this Not-for-Profit Organization.

Bob Dwyer, Director of Training; 877-546-3726; Erik Rasmussen, Director International Instruction

Supporting the following organization in their efforts of carbon monoxide safety!

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