

HAZARD FACTSHEET

CARBON MONOXIDE

What is Carbon Monoxide?

Carbon monoxide (CO) is an invisible gas with no odor or taste. If inhaled, it can cause poisoning resulting in illness, injury, or death.

Where is CO Found?

CO is produced whenever fuels such as gasoline, wood, coal, oil, or propane are burned. CO levels can build quickly, even in areas that seem well-ventilated. In transit workplaces, the internal combustion engine is the main way people are exposed to carbon monoxide. Buses, locomotives, trucks, cars, forklifts, and other equipment powered by gasoline, diesel, or other fossil fuels produce CO. Furnaces and heating units also produce CO.

Who is Most at Risk for CO Poisoning?

Bus and train operators and other transit workers such as fuelers, maintainers, cleaners, and clerical staff may be at risk of carbon monoxide poisoning. Certain people may be affected more quickly and become sicker if exposed to CO:

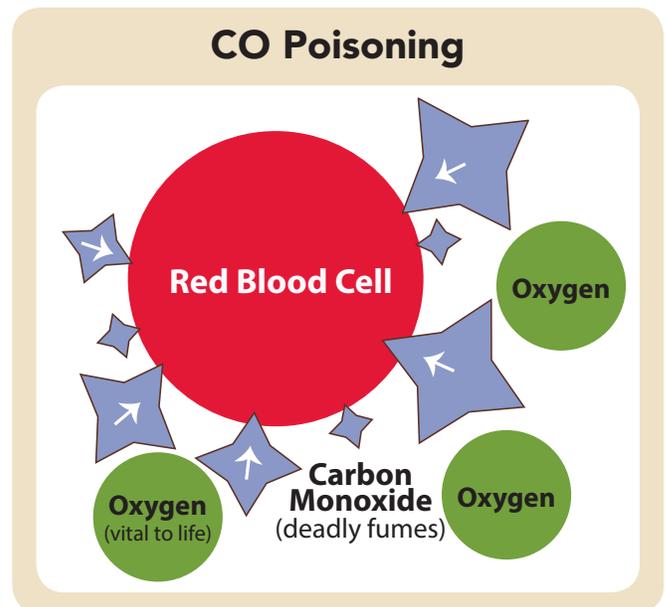
- Those with chronic heart disease, anemia, or breathing problems
- Pregnant women and their unborn babies
- Adults 65 and older

How Does CO Poisoning Work?

When inhaled, the body's red blood cells pick up CO more quickly than they pick up oxygen. If there is a lot of CO in the air, the body may replace oxygen in the blood with CO. This blocks oxygen from getting into the body, which can damage tissues and cause death. CO can also combine with proteins in the body's tissues and organs, such as the heart, damaging them and causing injury or death.

How quickly poisoning takes place depends on three factors:

- How much CO is in the air
- How long a person is exposed to CO
- How fast a person breathes in the CO (those doing physically hard work and breathing fast may absorb CO even more quickly)



What are the Signs of CO Poisoning?

Early warning signs of CO poisoning are a lot like flu symptoms and include headache, dizziness, fatigue, and nausea. It is important to recognize these early warning signs because as a person is exposed to more CO they may become confused, uncoordinated, and weak and become unable to escape the CO. Being exposed to high amounts of CO may cause convulsions, coma, or death by suffocation.

How is CO Poisoning Treated?

Almost all CO leaves the blood ten to twelve hours after exposure, regardless of the level of exposure. Getting to fresh air and away from the CO is essential to recovery. CO poisoning can be treated by restoring breathing with artificial respiration or resuscitation equipment. Carbon monoxide poisoning can be serious and may need to be treated by a physician. A person exposed to high levels of CO may suffer permanent brain, nerve, or heart damage.

How Can the Risk of CO Poisoning be Reduced?

Substitution

Electric or propane power can be used instead of gasoline in forklifts and other small vehicles inside the workplace.

Ventilation Systems

Mechanical ventilation systems effectively eliminate carbon monoxide from the workplace. Individual equipment or work operations can be enclosed and/or hooked up to a local exhaust system.

Training

Under OSHA's Hazard Communication Standard, employers must train exposed workers on the source, hazards, symptoms, and control of carbon monoxide poisoning.

Maintenance

Inspect and repair fuel-burning devices—engines, stoves, furnaces, and heaters—to ensure the lowest possible carbon monoxide emissions.

Monitoring

Because it is invisible, odorless, tasteless and is non-irritating, it is important to continuously monitor for CO. Workers can wear disposable personal monitoring badges or strips that change color when CO levels reach a dangerous level. Actual CO levels can be measured using air-monitoring instruments. Personal or area monitors with audible alarms are also available.

Safe Work Practices

Operating gasoline powered engines in buildings or partially enclosed areas increases CO exposure. If they must be used, direct the exhaust outside and away from air intakes.

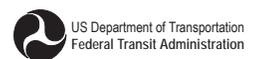
How is CO Measured?

The level of CO in the air is measured in parts per million (PPM). NIOSH (the National Institute for Occupational Safety and Health) reports that active workers exposed to concentrations of 80 to 100 PPM of CO for one to two hours suffer reduced physical abilities. Workers with pre-existing lung or heart conditions may suffer chest pain or irregular heartbeat. Exposure at 700 PPM for an hour or more may result in coma or death.

What Are the Legal Requirements and Professional Guidelines for CO Exposure?

The federal Occupational Safety and Health Act (OSHA) applies to transit employees who work for private companies. State OSHA plans apply to many transit employees working for government-owned transit systems or public authorities.

OSHA has a permissible exposure limit (PEL) for CO of 50 PPM averaged over an 8-hour work shift (29 CFR 1910.1000). State plans may be stricter than federal regulations. For example, the New York State plan has a PEL of 35 PPM. NIOSH recommends that the most a worker should be exposed to at any time is 200 PPM. The NIOSH IDLH (immediately dangerous to life and health) level for carbon monoxide is 1,200 PPM. Exposure to this level of CO could cause permanent health effects or death within 30 minutes.



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NTI's Hazard Factsheets provide transit workers and management with information to help recognize and resolve health and safety hazards. NTI offers a variety of other workplace health and safety training and educational resources.