



Toolbox Talk

Carbon Monoxide

Carbon monoxide defies all five human senses. You can't see it, smell it, touch it or taste it — and you certainly can't hear this potentially deadly gas, which has been called the silent killer.

One of the most widespread and dangerous industrial hazards, carbon monoxide (CO) is the most common cause of occupational gas poisoning leading to death. It is also flammable. CO asphyxiates or suffocates people by depriving the body of essential oxygen to sustain life. Oxygen is normally transported from the lungs to body tissues and muscles by red blood cells. These red blood cells have an attraction to carbon monoxide and will absorb it more readily than oxygen. CO in the bloodstream can reduce the amount of available oxygen to dangerously low levels.

Carbon monoxide results from the incomplete combustion of fuels. The most widely recognized source is the internal combustion engine in motor vehicles. (The noxious bluish-white exhaust fumes and gases you see coming from vehicle exhaust pipes is not CO. The smoke is produced by unburned oil and carbon particles and the odour by the presence of aldehydes in the exhaust gases.)

Natural sources such as forest fires create the largest amount of CO worldwide, but human-made sources such as internal combustion engines are a greater concern to workers. This is because they can produce localized, high-hazard areas, particularly in confined spaces or areas where there is poor ventilation.

Besides vehicles, CO emissions can come from:

- Portable generators
- Gasoline-powered tools
- Fires and explosions
- Natural gas space heaters
- Kilns, furnaces, and boilers
- Welding
- Cigarette smoking

The effects of CO poisoning vary from worker to worker, but there are certain predictable responses that result from the lack of oxygen available to the body tissue as the level of CO increases. The victim first notices a slight headache, usually in the forehead, gradually increasing in intensity.

Dizziness, drowsiness, and a feeling of nausea might then develop. Weakness and mental confusion can be mistaken for drunkenness, but these symptoms can contribute to death as the victim becomes unable to escape the CO. The headache becomes more severe and throbbing, and weakness and confusion progresses to collapse and coma. If the victim is not removed from further exposure, death can result quite rapidly.

CO turns the blood a bright cherry-red colour. With acute poisoning, this may cause a bright red face, lips, and tongue. However, these signs are not reliable enough to be depended on for diagnosis.

Workers with existing medical conditions, such as chronic lung and cardiovascular disease and severe anemia, may be at increased risk when exposed to CO. These conditions can limit the amount of oxygen carried in the blood to the tissues.

The risk of carbon monoxide poisoning can be reduced by preventing buildup of the gas at its source. Regular tune-up of devices that produce the gas is a first step. They will also operate more efficiently.

A secondary level of prevention is maintaining good ventilation. Exhaust fans and hoses are typically used to remove CO, but when ventilation is not sufficient, use personal protective equipment, such as respirators. Two types of breathing protection are effective against CO:

- Positive-pressure, self-contained breathing apparatus (SCBA). This consists of an air cylinder, normally worn on the back, and a full-face mask to protect the eyes and face. A hose connects the face mask to the regulator and the air cylinder. “Positive pressure” means the air pressure in the mask is higher than the air pressure outside the mask. This reduces the chance of toxic gases entering the face piece.
- Positive-pressure, supplied-air (airline) respirator. This consists of an airline attached to a regulator and a full-face piece. The worker must also wear an air bottle to allow escape if the air supply is cut off. CO monitors can help make sure the gas has not reached a dangerous level. A device coupling detection with an alarm is even better.

Since carbon monoxide does its damage without warning, one way to counter the danger is to install reliable detectors that give both visual and audible warnings immediately. It is important to select monitoring equipment that fits the needs of the work environment.

CO detectors sold for use in residential settings are not designed for use in work settings. CO detectors can be powered in three ways – battery, plug-in or hardwired. Personal and portable devices are also widely used, depending on the nature of the workplace.

When selecting equipment, the user should also find out what substances could interfere with the equipment. For example, some gases, such as nitrogen dioxide or sulphur dioxide, can

interfere with the instrument's sensor if they are present in concentrations above five parts per million. Purchasers should discuss potential interference with the supplier of the equipment and buy appropriate accessories, if necessary. The equipment must also be installed, calibrated and maintained according to the manufacturer's recommendations.

Despite brand or type, purchasers should ensure the device has been approved and labeled by an independent testing laboratory such as Underwriters Laboratories of Canada (ULC), Underwriters Laboratories (UL) or the Canadian Standards Association (CSA).

The material contained in this document has been prepared from sources believed to be accurate and reliable. Application of this information to a specific worksite should be reviewed by a safety professional. Anyone making use of the information set forth herein does so at their own risk and assumes any and all liability arising therefrom. Specific medical advice should be obtained through consultation with a physician or other trained health care practitioner.

The Quiz

These questions are meant to help you remember what was discussed today — not to test your patience or challenge your intelligence. The answers are at the bottom of the page. Cover them up, and complete the quiz as quickly as you can.

1. Carbon monoxide is the most common cause of workplace gas poisoning.

TRUE ____ FALSE ____

2. Can CO be seen in the exhaust fumes of motor vehicles?

YES ____ NO ____

3. Which of these are common sources of CO emission?

- A. Forest fires
- B. Portable generators
- C. Cleaning products
- D. Kilns furnaces and boilers
- E. All of the above

4. A bright red face, lips and tongue are a reliable indication of carbon monoxide poisoning.

TRUE ____ FALSE ____

5. Which of these are symptoms of CO poisoning:

- A. Headache, starting in the forehead
- B. Dizziness and drowsiness
- C. Weakness and mental confusion
- D. All of the above

6. Workers with chronic lung and cardiovascular disease are NOT at greater risk when exposed to carbon monoxide.

TRUE ____ FALSE ____

7. Which of these are measures to reduce the risk of CO exposure:

- A. Regular maintenance of CO-emitting vehicles and equipment.
- B. Ventilation fans and hoses.
- C. Respiratory protection.
- D. CO detectors.
- E. All of the above

8. Are you at risk of carbon monoxide exposure in your workplace?

YES ____ NO ____ DON'T KNOW ____

ANSWERS: 1. True, 2. No, 3. A, B, D, 4. False, 5. D, 6. False, 7. E, 8. Your answer

For the Record

Date of Meeting: _____

Location: _____ Start Time: _____ Finish Time: _____

Topic: _____ Meeting Leader: _____

In Attendance *(please print first & last names):*

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