Carbon Monoxide
Carbon monoxide (CO) is a poisonous, colorless, odorless, and tasteless gas.

CO is a common industrial hazard created from the incomplete burning of natural gas and other materials that contain carbon, such as gasoline, kerosene, oil, propane, coal, or wood.
One of the most common sources of CO exposure in the workplace is from **internal combustion engines**. Other sources include:

- Portable generators/generators in buildings
- Compressors
- Welding
- Space heaters
You can be exposed to harmful levels of CO in boiler rooms, breweries, warehouses, petroleum refineries, pulp and paper production, and steel production.

Jobs that can expose you to CO include welders, firefighters, garage mechanics, diesel engine operators, and forklift operators.
Several agencies have set exposure limits for CO.

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<th>OSHA</th>
<th>NIOSH</th>
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<td><strong>Permissible exposure limit (PEL)</strong></td>
<td><strong>Recommended exposure limit (REL)</strong></td>
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<td>• 50 parts per million (ppm) over an 8-hour time period</td>
<td>• 35 ppm as an 8-hour time-weighted average</td>
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The main route of exposure to CO is **inhalation**. Inhaling CO is harmful because it displaces oxygen in the blood, causing vital organs to be deprived of the oxygen they need.

Large amounts of CO can overcome a worker in **minutes**, causing loss of consciousness and suffocation.
Early symptoms of CO poisoning include tightness across the chest, headache, fatigue, dizziness, drowsiness, and nausea.

During prolonged or high exposures, your symptoms may worsen and include vomiting, confusion, and collapse, loss of consciousness, and muscle weakness.
If you suspect you or your coworkers are suffering from CO poisoning, quickly taking action can help save lives:

- Immediately move the victim to fresh air in an open area
- Call 911 or another local emergency number for medical attention or assistance
- If the victim is breathing, administer 100 percent oxygen using a tight-fitting mask
- If the victim has stopped breathing, administer CPR
You may be exposed to fatal levels of CO poisoning if you try to rescue a downed worker. **Rescuers** should be skilled at performing recovery operations and using recovery equipment.

Companies must make sure that rescuers are not exposed to **dangerous** CO levels when they perform rescue operations.
Your company should use work practices and controls to reduce worker exposure to CO in the workplace, including:

- Installing an effective ventilation system that removes CO from work areas
- Prohibiting the use of gasoline-powered engines or tools in poorly ventilated areas
- Providing personal CO monitors with audible alarms if potential exposure to CO exists
- Testing air regularly in areas where CO may be present, including confined spaces
- Installing CO monitors with audible alarms
If engineering controls and work practices cannot reduce worker exposure to CO below acceptable limits, respiratory protection is required:

- A full-facepiece pressure-demand self-contained breathing apparatus (SCBA) certified by NIOSH
- A combination full-facepiece pressure-demand supplied-air respirator (SAR) with auxiliary self-contained air supply in areas with high CO concentrations
If you will be working in a confined space where the presence of CO is suspected, your company must make sure workers test the space for oxygen sufficiency before entering.
Some ways to **reduce** the chances of CO poisoning in the workplace include:

- Reporting any situation to your company that might cause CO to collect
- Reporting complaints of dizziness, drowsiness, or nausea immediately
- Avoiding overexertion if you suspect CO poisoning and leaving the contaminated area
- Avoiding the use of gas-powered engines, such as those in powered washers, heaters, and forklifts, while working in enclosed spaces
Your workplace is not the only place you can be exposed to CO, it can also be a hazard at your home.

Many people **die** from CO poisoning, usually while using gasoline- powered tools and generators in buildings or semi-enclosed spaces without adequate ventilation.
Ways to prevent CO exposure outside of work include:

- Never use a generator indoors or in an enclosed or partially enclosed space, such as garages, crawl spaces, and basements.
- Make sure the generator has 3-4 ft. of clear space on all sides and above it to make sure there is enough ventilation.
- Do not use a generator outdoors if placed near doors, windows, or vents, which could allow CO to enter and build up in occupied spaces.
When using space heaters and stoves, make sure they are in **good working order** to reduce CO buildup and never use in enclosed spaces.
If you experience symptoms of CO poisoning, get to **fresh air** right away and seek immediate medical attention.
CO is a poisonous gas that is colorless, odorless, and tasteless. CO is a serious hazard that can kill you.

Avoid using gas-powered engines while working in enclosed spaces. Always take precautions to protect yourself from CO, both at work and at home.
1. ______ is a poisonous, colorless, odorless, and tasteless gas.
   A. Silica
   B. Carbon monoxide
   C. Hydrogen sulfide
   D. Asbestos

2. One of the most common sources of CO exposure in the workplace is from ____________.
   A. Your coworkers
   B. Fresh air
   C. Ventilation
   D. Internal combustion engines

3. The main route of exposure to CO is ____________.
   A. Inhalation
   B. Skin absorption
   C. Injection
   D. Ingestion

4. Jobs that can expose you to CO include ____________, firefighters, garage mechanics, diesel engine operators, and forklift operators.
   A. Welders
   B. Roofers
   C. Tree trimmers
   D. Airline pilots

5. OSHA’s carbon monoxide permissible exposure limit (PEL) is ________ over an 8-hour time period.
   A. 10 ppm
   B. 25 ppm
   C. 50 ppm
   D. 100 ppm

6. NIOSH's recommended exposure limit (REL) for carbon monoxide is ________ as an 8-hour time-weighted average.
   A. 25 ppm
   B. 35 ppm
   C. 45 ppm
   D. 55 ppm

7. Early symptoms of ________ include tightness across the chest, headache, fatigue, dizziness, drowsiness, and nausea.
   A. Asbestosis
   B. Silicosis
   C. Carbon monoxide poisoning
   D. Hydrogen sulfide exposure

8. Some ways to reduce the chances of CO poisoning in the workplace include ____________.
   A. Using gas-powered engines while working in enclosed spaces
   B. Reporting complaints of dizziness, drowsiness, or nausea immediately
   C. Remaining in an area where you suspect CO poisoning
   D. Ignoring any situation that might cause CO to collect

9. If you will be working in a confined space where the presence of CO is suspected, your company must make sure workers test the space for oxygen sufficiency ____________.
   A. Two days before
   B. Before entering
   C. On a yearly basis
   D. After entering

10. When using space heaters and stoves, make sure they are ____________.
    A. In good working order
    B. Kept in enclosed spaces
    C. Producing enough CO
    D. In poor condition
Instructors: The following key shows the answers for the Carbon Monoxide safety meeting quiz.

1. B
2. D
3. A
4. A
5. C
6. B
7. C
8. B
9. B
10. A
## STUDENT ROSTER

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Student Instructions: Print and sign your name. Also, provide your date of birth or the last four digits of your social security number.

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