

## SOP: Dilute Carbon Monoxide Gas Tank

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Location: 275 Stepan Hall of Chemistry and Biochemistry

Purpose of this SOP: Describe how to handle, secure, and dispense from dilute carbon monoxide (CO) gas tanks; describe how to monitor and remediate the most likely encountered hazards. This SOP covers gas tanks containing 500 ppm or less of CO.

Why we are using CO gas tanks: To generate environmentally relevant CO levels (< 500 ppm) in reaction vessels. We will use CO tanks that contain less than 500 ppm CO.

### Hazards:

Acute toxicity by inhalation

Pressurized container

Damage to organs through acute and/or chronic exposure

Toxic to reproduction

Flammable

Engineering Controls: Store gas tank only in a well ventilated area. Dispense and use CO only in the designated hood. Keep the hood sash low to help prevent contamination. Always use a monitor to measure CO levels inside the hood. In the event that CO escapes the hood or gas tank and enters the lab area, a CO alarm will sound if dangerous levels are exceeded. Another alarm is in the 275 student room.

### Other controls:

1. Never work by yourself. Another person must be within visual range at all times.
2. Never work with CO if you feel ill or have a headache. CO poisoning symptoms can be similar.
3. Post warning signs outside of 275 Stepan to alert people when CO is or is not in use.

PPE: Wear current lab minimum personal protective equipment (PPE). See departmental PPE SOP. Always wear goggles while transporting gas tanks, even in the hallways.

Waste Disposal: For gas tanks, leave unused CO in the tank and return it to the supplier. For reaction vessels, vent the gas in the hood and monitor the CO levels until they reach 0 ppm.

Uncontrolled Release (e.g., gas leak from cylinder or line): If CO alarms are sounding, evacuate the area. Pull the fire alarm so others exit the building instead of walking into a contaminated room. Call 911 or 1-5555 from a Notre Dame phone.

#### Procedure for installing a gas tank:

1. Obtain tank from shipping dock and transport to lab using the gas tank cart. Wear goggles!
2. Secure the tank at its storage location with chains.
3. Turn on CO monitor and check that it is in working order.
4. Take off cylinder cap.
5. Attach pressure regulator and gas lines that lead to appropriate hood.
6. Adjust stepdown valve to low psi.
7. Pressurize the gas lines by opening the main valve but leaving the outlet closed.
8. Measure the CO levels near all fittings to make sure there are no gas leaks. If there are gas leaks, tighten the fittings. It may be necessary to attach a different regulator. If the gas leak is persistent, close the main valve, and contact the gas tank supplier for advice.
9. If no gas leaks are detected, close the main valve.

#### Procedure for removing a gas tank:

1. Make sure all valves are closed.
2. Turn on CO monitor and check that it is in working order.
3. Open the outlet valve only while leaving the main valve closed. This will release any pressurized CO in the gas lines.
4. Measure the CO concentration at the outlet until it comes down to 0 ppm.
5. Make sure the main valve is closed! Detach the regulator, place it into the hood, and monitor the CO level until it is at 0 ppm.
6. Screw on gas tank cap.
7. Transport tank to shipping dock using the gas tank cart. Wear goggles!

#### Procedure for day-to-day use:

1. Find a lab mate who has been trained on this SOP and can stay in lab with you the entire duration of the experiment.
2. On the outside of the door to 275 Stepan, turn the warning sign to read "Carbon monoxide in use."
3. Record on the control chart the peak level of CO as displayed by the monitor. If higher than 0, determine where the leaked occurred. Clear the monitor's memory.
4. Turn on CO monitor and check that it is in working order.
5. Open the main valve but leave the outlet closed.
6. Record the gas tank pressure on the control chart. If the pressure is lower, there was an unintended gas leak and it must be reported to Risk Management & Safety (RMS).
7. To perform experiment, open the outlet valve and fill the reaction vessel to the desired level, then close the outlet valve.
8. When the experiment is over, leave the reaction vessel in the hood and open it to degas until the CO monitor reads 0 ppm.
9. Close main valve at the end of the experiment.
10. Record gas tank pressure on the control chart.
11. On the outside of the door to 275 Stepan, turn the warning sign to read "Carbon monoxide not in use."





# Carbon Monoxide in Use



The lab is equipped with CO alarms. Do not enter if sounding.

# Carbon Monoxide NOT in Use

