

Compressed Gas Standard Operating Procedure

Revision: February 20, 2023

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This standard operating procedure (SOP) outlines the handling and use of compressed gases. Compressed gases come in a large variety of sizes and pressures. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling compressed gases. All laboratory workers must read and understand the [Laboratory Emergencies SOP](#) prior to commencing any work in a laboratory.

Description [Provide additional information as it pertains to your research protocol]

A compressed gas is any mixture or material in a container with either an absolute pressure exceeding 40 psi at 70°F or an absolute pressure exceeding 104 psi at 130°F. Any liquid flammable material having a vapor pressure exceeding 40 psi at 100°F is also considered a compressed gas.

Process [Write the steps for using the chemical in your research protocol]

Potential Hazards [Provide additional information as it pertains to your research protocol]

The large amount of potential energy contained in a compressed gas cylinder makes it a potential rocket or bomb if the pressure is released through rupture of the valve or container failure.

Compressed gases may also be toxic, flammable, or explosive – check the safety data sheet for more information. Safety considerations for these properties **must** also be followed.

Engineering Controls [Provide additional information as it pertains to your research protocol]

Storage of compressed gas cylinders requires sturdy chains or straps secured to a wall or cabinet, and/or a cylinder stand. Gas and gas cylinders **must** be used and stored in well-ventilated areas (i.e., lab ventilation having a minimum of 6 air changes per hour). Contact Environment, Health & Safety (EHS) at (734) 647-1143 to determine if the ventilation is adequate or if an oxygen-deficiency monitor or other alarm devices are needed.

Work Practice Controls [Provide additional information as it pertains to your research protocol]

All compressed gas cylinders **must** be legibly marked by stenciling, stamping, or label with at least the chemical name or commonly accepted name of the material contained. In addition, cylinders should bear the approved markings of the Department of Transportation stamped in the metal at the top of the cylinder.

- Check connections and hoses regularly for leaks using a specific monitoring instrument or soapy water (or equivalent).



- When using highly flammable or toxic gas, check the delivery system using an inert gas prior to introducing the hazardous gas.
- Replace valve caps when cylinders are not in use or before moving.
- Remove damaged or defective cylinders from service (contact the cylinder vendor for assistance).
- Remove unused or empty cylinders from lab space.
- Refer to the [EHS Compressed Gas Program](#) or consult with your EHS representative regarding maximum allowable quantities of compressed gases.

Inspecting Cylinders and Associated Equipment Prior to Use:

- Cylinder labels: The name of the gas or gas mixture and the primary hazard associated with that chemical (flammable, oxidizer, etc.) is on the cylinder and legible.

NOTE: Do not accept a cylinder without a proper label; contact the manufacturer or supplier.

- Labels for associated equipment: Present and legible.
- Cylinder mounting and restraining devices: Any signs of damage or loss of integrity.
- Cylinder:
 - Any corrosion, pitting, cuts, gouges, bulges, neck defects and general distortion?
 - Any leaks?

NOTE: If a cylinder is leaking and the cylinder contains a hazardous material, then complete the following steps:

1. Contact DPS at 911 from any campus phone.
2. Evacuate the area until the EHS emergency response team arrives.

- Connections and hoses: Any leaks, damage to or cracks in the connections or hoses?

NOTE: To check for leaks using a specific monitoring instrument or soapy water (or equivalent).

- Regulators and valves:
 - Confirm with the gas supplier that the regulator is the appropriate regulator.
 - Any damage, cracks, corrosion, leaks, or other defects?

NOTE: When removing a pressure relief device (burst disk), first close the cylinder valve, then release the pressure from the cylinder.

NOTE: To check cylinder burst disks and connections for leaks, use a soapy water solution for cylinders containing argon, nitrogen, hydrogen or [air](#). For other gases, consult the gas supplier.

- Delivery system when using highly flammable or toxic gas

NOTE: When using highly flammable or toxic gas, test the delivery system using an inert gas prior to introducing the hazardous gas.

Personal Protective Equipment [Provide additional information as it pertains to your research protocol]

Safety glasses **must** be worn for all work involving compressed gas cylinders. Cylinders **must** be secured to a gas cylinder mount, bracket, or clamp. These securing devices **must** be attached to a stable surface such as a permanent bench top or a wall.



Transportation and Storage [Provide additional information as it pertains to your research protocol]

- Cylinders **must** be stored in an upright position.
- Cylinders (full or empty) shall be secured by chains, straps, or other sturdy tie downs during storage and transport.
- Cylinders shall be grouped by type of gas, and the groups segregated as to compatibility.
- Full cylinders shall be separated from empty cylinders within the storage area.
- Flammable gases shall be separated from oxidizing gases.
- Cylinders shall not be stored at temperatures above 125 °F. or in direct sunlight, or outside of the temperature range specified by the manufacturer.
- Cylinder valves shall be kept closed when not in use.
- Removable caps shall be kept on cylinders at all times, except when cylinders are in use.
- Cylinders shall be protected against tampering and damage.
- Cylinders shall not be stored near combustible materials.
- Cylinders shall not be refilled except by authorized suppliers.
- Open flames and smoking shall not be permitted in areas where oxygen is used or stored. "No Smoking" and "No Open Flames" signs shall be conspicuously posted in these areas.
- Cylinders **must** not be used or stored in cold rooms or other unventilated enclosures.

Waste Disposal [Provide additional information as it pertains to your research protocol]

Gas cylinders **must** be returned to the gas supplier or properly disposed of. **Do not dispose of gas cylinders in regular trash containers, unless authorized by EHS, Hazardous Materials Management (HMM).** Contact HMM at (734) 763-4568 for questions regarding proper disposal. Also, refer to the EHS [Hazardous Waste Web page](#) for more information.

Procedure: Preparing Compressed Cylinders for Disposal

1. Close and tighten valves and replace safety caps on cylinders.
2. Leave some positive pressure (a minimum of 20 psig) in the empty cylinder to prevent "suck back" and contamination.
3. Contact the vendor or supplier to obtain specific guidelines for shipment of compressed gas cylinders to be returned to them.
4. If the compressed gas cylinder or lecture bottles cannot be returned to the vendor or supplier, contact Environment, Health and Safety, Hazardous Materials Management (734) 763-4568 to arrange for removal of cylinders. Refer to the procedure [Completing the Waste Manifest for Hazardous Waste](#) for more instructions.
5. Write "Empty" or "MT" on the outside of each empty compressed gas cylinders and lecture bottle.
6. If applicable, place lecture bottles that will be picked up by HMM in a box.

Training of Personnel

All personnel shall read and fully adhere to this SOP when handling compressed gases



Certification

I have read and understand the above SOP. I have received approval from my Lab Director to perform this procedure. I agree to contact my Lab Director if I plan to modify this procedure.

Name	Signature	UMID #	Date

Laboratory Director

Revision Date



Revision History (Do not print as part of SOP)

02/20/2023	Partial Revision	Removed emergency information sections, duplicate of new Laboratory Emergencies SOP. (DML)
03/04/2019	Annual Revision	
09/13/2018	Partial Revision	EHS name and logo were added, updated the formatting, and revised the content under Exposure/Unintended Content (AKJ).