

University of Waterloo Mass Spectrometry Facility (UWMSF)

Compressed Gases Standard Operating Procedure (SOP)

NOTE: As a user of the UWMSF, if you notice that any of the compressed gas cylinders in either C2-267 or C2-268 are low, please email or find Dr. Yiming Xiao (YX) and Dr. Joshua Featherstone (JF) who will change the cylinder in question. Please do not attempt changing the cylinder yourself unless you've taken the appropriate UW mandated safety course(s). If you do change a cylinder please follow this SOP. The compressed gases used in the Facility include Argon, Helium and Nitrogen.

Guidelines:

This standard operating procedure (SOP) is intended to provide general guidance on how to safely work with compressed gases. This general use SOP only addresses safety issues specific to compressed gases. In some instances, several general use SOPs may be applicable for a specific chemical (i.e., for flammable gases, both this general use SOP and the general use SOP for flammables would apply). If you have questions concerning the applicability of any item listed in this SOP contact YX, JF or the Safety Office (x33587).

Hazardous Chemicals/Class of Hazardous Chemicals

Compressed gases have inherent pressure hazards and can also create health hazardous and/or flammable atmospheres. Compressed gases may also be flammable, toxic, and/or corrosive. Some gases (i.e., silane, diborane, phosphine) are considered pyrophoric (will ignite spontaneously in air). One additional hazard property common to all compressed gases is the substantial volume expansion when released to air. Gas release in an inadequately ventilated room can create an oxygen-deficient environment.

Control of Hazards- General

- 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.

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- Remove damaged or defective cylinders from service (contact the cylinder vendor for assistance).

Engineering/Ventilation Controls

If the process does not permit gas use and/or storage in well-ventilated areas (i.e., lab ventilation having a minimum of 6 air changes per hour), contact the Safety Office (x33587) to determine necessity of an oxygen-deficiency monitor or other alarm devices. Personal Protective Equipment In addition to proper street clothing (long pants (or equivalent) that covers legs and ankles, and close-toed non-perforated shoes that completely cover the feet), wear the following Personal Protective Equipment (PPE) when performing lab operations/tasks involving compressed gases:

- Safety glasses
- Lab coat

Special Handling Procedures and Storage Requirements

Safe Handling:

- Compressed gas cylinders must be transported using hand-trucks or other appropriate means. NEVER TRANSPORT UNSECURED COMPRESSED GAS CYLINDERS!
- Cylinders should be transported upright whenever possible (always transport acetylene in an upright (vertical) position).
- Elevators can be a confined space – NEVER ride in an elevator with compressed gas cylinders. Have one person send the elevator and another person receive the elevator.
- Secure compressed gas cylinders (>26" tall) to an anchored rack using two metal chains (at 1/3 and 2/3 cylinder height).
- No more than two cylinders may be secured with one pair of chains.
- Segregate and clearly mark full and empty ("MT") cylinders.
- Store compressed gas cylinders away from heat sources, and flammable and highly combustible materials (such as oil and greases).

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- Segregate according to hazard class and chemical compatibility. Ensure to separate flammable and oxidizing gases.
- Store flammable gases away from flammable solvents, combustible material, ignition sources (including unprotected electrical connections), and oxygen gas cylinders and liquid oxygen (at least 20 feet if possible). Additionally, follow all substance-specific storage guidance provided in MSDS documentation.

Spill and Accident Procedures

Prompt response to chemical spills is critical to protect worker health and safety and to mitigate adverse affects to the environment. Laboratory personnel who work with hazardous chemicals are to be provided the opportunity to receive medical attention/consultation when:

- A spill, leak, explosion or other occurrence results in a hazardous exposure (potential overexposure).
- Symptoms or signs of exposure to a hazardous chemical develop.

Waste Disposal

- Coordinate with vendor for return of cylinders.

Minimum Training Requirements

- WHMIS 2015
- Laboratory Safety
- Compressed Gas Safety

Designated Area

For compressed gases that are also considered particularly hazardous chemicals, a designated area shall be established per the other applicable SOP(s).