



**LECTURE BOTTLE SAFETY  
STANDARD OPERATING PROCEDURE**

**I. Description**

- a. This standard operating procedure outlines the handling, use, and disposal of lecture bottles. Lecture bottles are very small compressed gas cylinders, typically 12-18 inches (300-460 mm) long and 2-3 inches (25-76 mm) in diameter.
- b. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques with lecture bottles.

**II. Potential Hazards**

- a. Hazards associated with compressed gases include toxic gas exposures, explosions, oxygen displacement, fires, and physical hazards due to the high pressures inside the cylinders.
- b. Check the Safety Data Sheets (SDS) for more information. Safety recommendations provided by the supplier must be followed.

**III. Engineering Controls**

- a. For toxic gases, perform work under a fume hood or ensure that the delivery system or experimental apparatus using hazardous gases is enclosed and connected to an exhaust ventilation system. Ensure that the room where compressed gases are being used has sufficient ventilation.

**IV. Work Practice Controls**

- a. All compressed gas cylinders shall be legibly marked with the name of the gas or gas mixture and the primary hazard associated with that chemical, e.g., flammable, oxidizer, etc.
- b. Do not accept a cylinder without a proper label. The gas cylinder must also be tagged or labeled with either "full" "in use" or "empty."
  - i. Inspect lecture bottles and regulators prior to use for integrity. Do not use if corroded, gouged, bulging, pitted, or damaged. Check connections and hosing/tubing for leaks and integrity.
  - ii. Lecture bottles must be properly secured and upright during use. Commercially sold lecture bottle stands are available.
  - iii. Use engineering controls for toxic gases, e.g., chemical fume hoods.
  - iv. Only use regulators and tubing appropriate for the type of gas and that comply with the manufacturer's instructions.
  - v. Never leave pressure on a hose or line that is not being used.

- vi. Ensure the nearby availability of an eyewash station and emergency shower when working with corrosive gases.
  - vii. Never heat a cylinder to raise the pressure of the gas.
  - viii. Refilling, repair, or alteration of the cylinder is prohibited.
  - ix. Do not place cylinders where they might become part of an electrical circuit or allow them to come into contact with an electrically energized system.
  - x. Follow purging procedures, if available.
  - xi. When using highly flammable or toxic gas, check delivery system using an inert gas prior to introducing the hazardous gas.
  - xii. Removed any damaged, defective, unused, or empty cylinders from lab space.
  - xiii. **For lecture bottles of anhydrous hydrogen fluoride, dispose of within 2 years of purchase.**
- c. For additional information and training refer to [Compressed Gases and Cryogenics SOP](#).

#### V. Personal Protective Equipment (PPE)

- a. Safety glasses must be worn for all work involving compressed gas cylinders. If the compressed gas is corrosive, safety goggles and proper gloves must also be worn.
- b. Perform a Personnel Protective Equipment (PPE) assessment in accordance with the [Personal Protective Equipment \(PPE\) SOP](#) to determine the level of protection needed for the task.
- c. Review the SDS.

#### VI. Transportation and Storage

- a. Lecture bottles must be stored in an upright position because lecture bottles are more susceptible to damage and leaks when stored on their side. Lecture bottle holders can be purchased from compressed gas supply companies.
- b. Segregate incompatible gases such as flammable and oxidizing gases.
- c. Cylinders of flammable gas must be stored away from sources of heat or ignition, oxidizers, combustibles, and other incompatibles at a distance of at least 20 feet unless separated by a one-hour, fire-rated wall.
- d. Store toxic gases in a fume hood or gas cylinder cabinet.
- e. Regulators must be removed during storage.
- f. Cylinders shall be maintained at temperatures below 125°F (50°C) or within of the temperature range specified by the manufacturer and stored out of direct sunlight.
- g. Never drop, bang, or strike cylinders against each other or other objects.

#### VII. Waste Disposal

- a. Unlike other gas cylinders, lecture bottles are not refillable and are purchased outright by the laboratory. Lecture bottles are costly to dispose of. Costs for disposal can range from \$100 for a non-hazardous, properly labeled lecture bottle to over \$1000 for a hazardous or unlabeled lecture bottle.

- b. Contact the supplier to obtain specific guidelines for shipment of lecture bottles to be returned to them.
- c. **Avoid purchasing non-returnable lecture bottles, or from suppliers who do not accept returned lecture bottles with unused or empty contents.**
- d. Contact EHS to arrange for the removal of lecture bottles that cannot be returned to the supplier.
  - i. If the cylinder is empty, write “empty” on the outside of each cylinder and place in a cardboard container and submit a [Hazardous Waste Disposal form](#).

#### **VIII. Emergency Procedures**

- a. If an employee or student is in need of emergency medical attention, call TTU Police at 372-3234 or 911 immediately.
- b. Call University Police at 372-3234 or 911 immediately if there is a leak involving a hazardous lecture bottle. Evacuate the laboratory if the lecture bottle is not in a fume hood or gas cabinet.
- c. Report all work related accidents, injuries, illnesses or exposures to [Human Resources](#).

#### **IX. References**

University of Michigan, Lecture Bottles-Compressed Gases SOP

University of Pennsylvania, Lecture Bottles Safety

NFPA 55 Compressed Gases and Cryogenics Fluids Code

OSHA 29 CFR 1910, Subpart H