

Policy 2007

Gas Cylinder Safety

Purpose

The object of this Safety Policy is to ensure the physical safety of all faculty, staff, students, and visitors. The Safety Policy is determined and monitored by the Department Safety Committee. The University's Comprehensive Safety Plan will amplify and amend this policy. The Departmental Chemical Hygiene Plan detailing procedures for safe handling of chemicals in laboratories is identical to that of the JMU Chemistry Department. Each laboratory has a copy as well.

Guide to the department safety policies and procedures:

Safety Committee:

The Physics Department Safety Committee Members meet as needed to discuss safety issues. The Safety Committee is appointed by the Department Head. The members of the safety committee include three or more Department members as necessary.

Safety/Emergency Notices:

There are three types of notices to be found in the department.

Emergency Escape Procedure:

Emergency escapes routes are posted throughout the department, near the exit areas.

Safety Information:

Safety information posters are yellow, located on the outside of laboratory doors. Contains information pertaining to hazardous materials and whom to contact in case of an emergency.

Applicability

The policies and procedures described here apply to all department personnel, faculty, staff and students.

Policy

Compressed gas cylinders are used in many research and support activities on campus. Cylinders present significant hazards due to the high pressure of gases contained within the cylinders. Persons using or handling cylinders should receive basic training from their supervisor. At a minimum, this training should include review of operating and safety protocols for tasks to be performed, review of appropriate Safety Data Sheets (SDS), and hands-on assistance by an experienced gas user. This document presents general guidelines for use, transport and storage of gas cylinders.

Using and Transporting Gas Cylinders

- Read the label on the cylinder before connecting a new cylinder of compressed gas. If the label is illegible or missing, return the cylinder to the supplier. Do not rely on stenciling or color of the cylinder. Never use a cylinder with unidentified contents.
- Keep cylinders upright. Never lay cylinders containing flammable gases on their sides. If a gas cylinder valve is damaged, the contents can exit with great force. Cylinders propelled by their contents may penetrate cinder block walls. Cylinders should be affixed via two brackets to a permanent building fixture such as a bench or wall during use or storage. Refer to the figure at the end of this document for recommended storage. When the cylinder has no regulator attached, replace the valve cover and screw it down.
- Transport cylinders larger than lecture bottle size with a hand truck. Rolling or "walking" cylinders is extremely hazardous. **Never transport a cylinder with a regulator attached!** Always protect the valve during transport by replacing the valve cover.
- Select a regulator recommended for use with your cylinder. The pressure, purity, and corrosive properties of the gas will determine the correct regulator. Never attempt to use a cylinder without a regulator or some other pressure-reducing device in place.
- When preparing to withdraw gas from a high-pressure cylinder, close the regulator first by turning the handle counterclockwise. Open the main cylinder valve until it stops and adjust the gas flow rate by opening the regulator. For cylinders containing fuel gases, open the cylinder valve one-quarter turn, adjusting the regulator as above.
- When you are finished using a compressed gas system, turn off the main cylinder valve, bleed the regulator and lines, and close the regulator. Do not leave the regulator under pressure by closing down flow from the regulator without shutting off the main cylinder valve. Be sure to LOCKOUT upstream gas lines leading to equipment prepared for maintenance. Compressed gases are a hazardous energy source requiring lockout/tagout procedure. Adequately purge lines following lockout procedures and before beginning maintenance.
- Avoid draining a cylinder completely. Air can be sucked back through the valve, contaminating the cylinder or creating an explosive mixture. Place an 'empty' tag on the cylinder if its pressure drops below 25 psi.

Precautions for Specific Gases

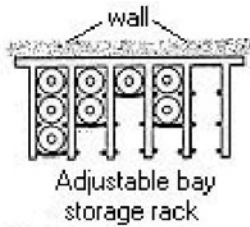
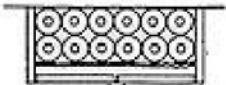
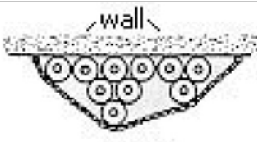

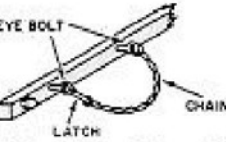
- Consult the Safety Data Sheet (SDS) for all gases used. Some gases are corrosive (hydrogen chloride), toxic (ethylene oxide), anesthetic (nitrous oxide), or highly reactive (anhydrous ammonia).
- Flammable gases such as propane, hydrogen, and acetylene always have a red label. However, the color of the cylinder itself is not a good indicator of flammability as different distributors may use different colored cylinders for the same gas. Check the label for flammability.
- Gases with Health Hazard Ratings of 3 or 4, or a rating of 2 with no physiological warning properties (arsine, carbon monoxide, hydrogen, phosgene, phosphine, etc.),

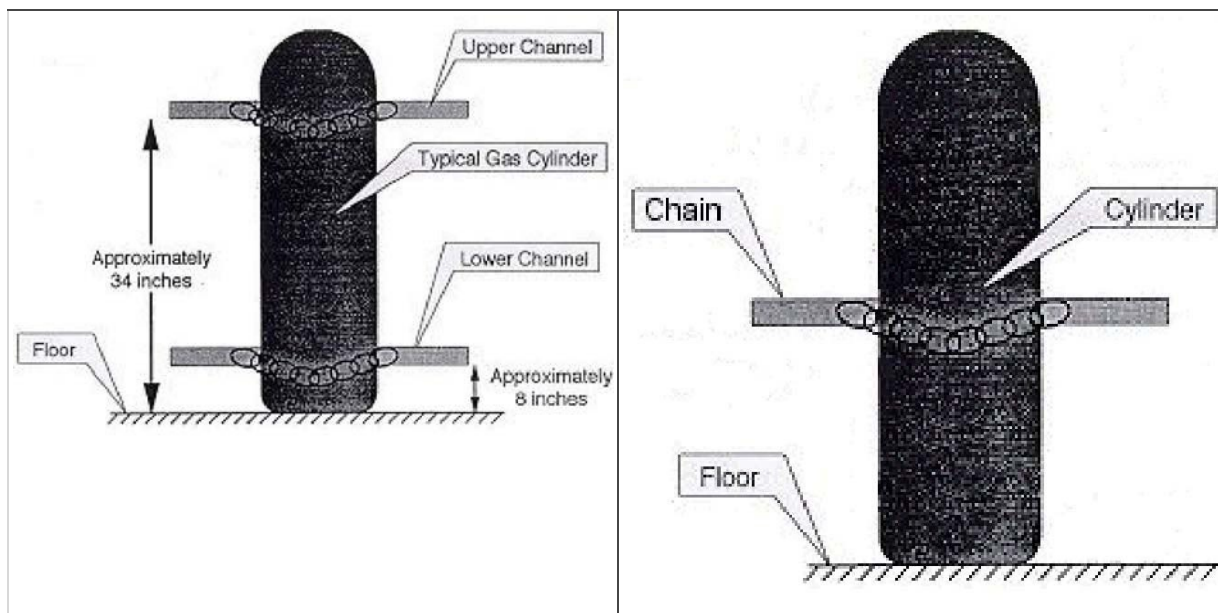
MUST be kept in a hood or other ventilated enclosure. Purchase and store the minimum amounts necessary. If a hazardous gas cylinder develops a leak, evacuate and restrict area access. Remove sources of ignition if the gas is flammable.

- Cylinders not needed for current use should not be stored in laboratories. Recommended maximum retention periods for gases are 36 months for liquefied flammable gases, flammable gases, and oxygen; 6 months for corrosive or unstable gases or those with a Health Hazard Rating of 3 or 4.
- Inert gases, such as nitrogen and carbon dioxide must be treated with caution. If left to leak into closed space, these gases may displace oxygen and create a risk of asphyxiation.
- Compressed oxygen, while not combustible itself, will cause many materials to burn violently. Never use grease, solvents, or other flammable material on an oxygen valve, regulator, or piping.
- Toxic, corrosive, and pyrophoric gases have special handling and storage requirements. Contact the supplier for additional information if you plan to use these gasses.

Gas Cylinder Storage

Store cylinders in a well-ventilated area away from ignition sources. Fuel gases must never be stored in an enclosed area, such as a closet. Never store cylinders under stairways or in hallways designated for emergency egress. Keep oxygen cylinders a minimum of twenty feet from flammable gas cylinders. If this cannot be done, consult JMU campus facilities management for guidance. Mark empty cylinders, close their valves, and segregate them from full cylinders. Protect the valves by installing the valve caps. For outdoor storage, provide drainage, overhead cover, and security. Examples of correct and incorrect storage are shown below.

Recommended		Not Recommended	
 <p>Adjustable bay storage rack</p>	 <p>Secured storage in public access area</p>	 <p>Cylinders not adequately supported</p>	 <p>Individually supported cylinders</p>
	 <p>Detail - eye bolts, chain, and latch</p>		



Fire and Other Emergencies:

If you observe a fire, sound an alarm. **Call 9-1-1 (or 86911) on the nearest telephone.** Public Safety will respond to all alarms and take appropriate action. On the sounding of a fire alarm, it is the responsibility of each individual to secure any experimental equipment (if doing so does not endanger his/her personal safety), close the door of the work area and leave the building by prescribed exit routes. Emergency exit routes are posted throughout the building and on the inside door of each room. On leaving, everyone is to gather across from the main entrance to the building.

Injuries:

All injuries serious enough to require treatment by a doctor should be reported to the department head. In the event of a serious accident, some member of the faculty should be immediately notified. For accidents involving radioactive or carcinogenic materials, also call the general emergency number, **8-6-9-1-1**.

Training:

Physics majors will be introduced to the safety manual during their freshman year in **either 105 or the majors lab**. Students who are working with a professor should have review instruction on safety at the beginning of their work, upon the introduction of new risks into the laboratory and at least yearly thereafter.

Responsibilities

All personnel are responsible for alerting others to potential hazards in their presence. It is everyone's responsibility to correct (if possible) and report an unsafe conditions to the faculty in charge of the lab. If unsafe conditions persist, notify the laboratory manager or the department head. **All accidents must be reported to the department within 24 hours.**

Sanctions

Students violating these rules or promoting an unsafe working environment will have their access privileges suspended or revoked at the discretion of the department head.

Exclusions

There are no exclusions to the this policy. There may, however, be additional restrictions or procedures imposed in specific laboratories. This is true in particular for the [machine shop](#).

Last Revision Date: April 4, 2023