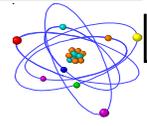


LABORATORY SAFETY FACT SHEET



Compressed Gas Cylinders

Compressed gas cylinders must be handled carefully by trained individuals. The diffusive nature of gas can result in serious hazards over large areas. Gas cylinders can be hazardous because

- 1) if they are mishandled, they can become “unguided missiles” with enough explosive force to go through concrete walls due to the high pressure inside the tank.
- 2) they often contain materials which are inherently toxic or highly flammable. For these reasons, particular care must be exercised with compressed gases.

Toxic and flammable gases have stringent and specific requirements for use and storage. UCSB has developed a Campus Toxic Gas Program, the requirements of which exceed the reach of this manual. All new installations must meet this requirements prior to use. Many of the campus labs using these gases have been and will be retrofitted to comply with current Fire Code regulations. Examples of some of the more common lab gases which fall under the provisions of this program include: fluorine, ammonia, diborane, ethylene oxide, nitric oxide, nickel carbonyl, phosgene and silane. Call the EH&S Lab Safety Specialist at x4899 for additional details.

TRANSPORT

- When transporting compressed gases or cryogenics on elevators use service or freight elevators when available. In addition, when transporting cryogenics by elevator:
 - o Post a sign reading “DO NOT ENTER – GAS TRANSPORT” to exclude passengers.
 - o When possible, have someone send the elevator up while another person waits on the receiving floor to take the cylinder out of the elevator. If this is not possible, another plan should be devised to ensure that the cylinder is taken out of the elevator once it reaches the desired floor.
- Disconnect regulators and other apparatus prior to transport.
- Always replace the valve cap before transporting cylinders.
- Cylinders must always be transported using a hand truck or cart designed for that purpose
Transport cylinders upright.
- Do not move a cylinder by rolling, dragging or walking it across the floor. Never leave a cylinder free-standing.
- Never drop cylinders or bang them against each other or another object.

Leaks

- If the material in the tank is **toxic or flammable** and you suspect a leak, get everyone out of the area and report it to EH&S at x3194 and Dispatch at 9-911.

Storage

- All cylinders must be secured upright with **chains and brackets** bolted to a solid structural member. Chains should be 3/16 inch welded link or equivalent. Two chains must be used to secure each cylinder at a point two-thirds up and 1/3 below the cylinders height. C-clamp bench attachments and fiber/web straps are not acceptable because they are not seismically sound. Any variations of these requirements must be approved by EH&S. (Campus Policy 5445)
- Keep cylinders away from heat and sources of ignition. Do not place cylinder where contact with any electrical circuit can occur. Protect cylinders from weather extremes, dampness and direct sunlight.
- Inspect cylinders and delivery equipment routinely for signs of wear, corrosion, or damage.
- All cylinders must be clearly labeled as to their contents — do not use unlabeled cylinders and do not rely on color coding for identification.
- Understand that “Empty” implies “end of service” and as such, the cylinder may still have greater than 25 psig of pressure remaining.

Use

- Gas delivery systems involving toxic gases must be authorized by EH&S prior to installation and operation.
- Use **regulators** designed for a specific gas. (Consult your gas vendor or catalog for proper regulator **compressed gas association (CGA) number** (on nut) for use with corresponding compressed gas cylinder. Do not use any adapter between cylinders and regulators.
- Post **signs** in laboratory area when using corrosive, toxic or flammable gases. The door placard system maintained by EH&S on the campus may be used for this.
- Never modify, adapt, force or lubricate safety devices, cylinder valve or regulator.
- Do not allow grease or oil to come into contact with **oxygen** cylinder valves, regulators, gauges or fittings. An explosion or fire can result. Oxygen cylinders and apparatus must be handled with clean hands and tools. Remember that oxygen supports and greatly accelerates combustion.
- Never force a gas cylinder valve — if it cannot be opened by the wheel or small wrench provided, the cylinder should be returned.
- When opening cylinder valve, do not hold regulator. Stand with valve between you and regulator. Open cylinder valves slowly, directed away from your face.
- Release a compressed gas gently to avoid build-up of static charge which could ignite a combustible gas.
- Special precautions are necessary for acetylene usage. Note that **acetylene** can form explosive compounds in contact with copper or brass. Consult the vendor or manufacturer for proper operating equipment and procedures.
- **Do not extinguish a flame** involving a highly combustible gas until source of gas has been shut off. Re-ignition can cause an explosion.

Disposal

- Empty cylinders should be labeled “EMPTY” or “MT. Always leave at least 25 psi minimum pressure in all “EMPTY” cylinders to prevent contamination and the formation of explosive mixtures.
- Return damaged or corroded cylinders and cylinders with a test date **more than five years** old stamped on the shoulder to the vendor. Some gas cylinders should be disposed or returned at shorter intervals (e.g., **corrosives** should be disposed or returned every six months since they readily attack the cylinder fittings).

For further information, contact the EH&S Laboratory Safety Specialist at x-4899