



# UCLA - Compressed Gas Cylinder Storage and Handling



## Purpose

UCLA is committed to provide safety guidelines concerning the handling and use of portable compressed gas cylinders. Compressed gases represent both physical and potential chemical hazards (gas specific). The gases within the cylinders vary in chemical properties ranging from inert and harmless to toxic and explosive. The high pressures of the gases inside the cylinder pose a serious threat to life and property during physical damage and/or exposure to high temperatures. Hence to safely store and efficiently handle the compressed gas cylinders, UCLA affiliated personnel using compressed gas cylinders must be aware of the contents in this policy.

## Scope

This policy is applicable university wide: All the laboratories (research and academic) and all non-laboratory areas (Facility Maintenance, Physical Plant, Shops etc.) where compressed gas cylinders will be/are used and/or stored.

## Procedures

### Responsibility of the users

1. Compressed gas cylinders must be handled only by experienced and properly instructed personnel. This includes the right to know information on the chemical container and MSDS.
2. The user of the cylinder and the person installing should check the identity of the gas before use. If the cylinder content is not identified, if hydrostatic test date is past due, or if the cylinder is in any way damaged, the cylinder should be returned to the supplier.
3. The user shall not modify, tamper with, paint, deface, obstruct, remove or repair any part of the cylinder, including the pressure relief device and the container valve or the valve protection device.
4. The user is solely responsible for the proper disposal of the cylinder when it is empty or no longer needed.
5. The user is responsible to maintain an inventory of all gases (cylinders) used and stored in their area. This inventory must be given to the EH&S once a year.

### Identification

1. All compressed gases received, used or stored must be labeled according to U.S. DOT and the OSHA regulations. Each cylinder must be marked by label or tag with the name of its contents. It is the manufacturer's and shipper's

2. Material Safety Data Sheets (MSDS) must be obtained and maintained (hardcopies) for all compressed gas cylinders. MSDSs can be found on-line at <http://msds.ehs.ucla.edu>
3. Empty cylinders must be marked EMPTY and stored apart from full cylinders while waiting to be removed.
4. Rooms or cabinets containing compressed gases must be conspicuously labeled "Compressed Gas". Gas cylinder storage areas must be prominently posted with the hazard class and the name of the gases stored (NFPA fire diamond).
5. Piping systems require additional labeling and marking.

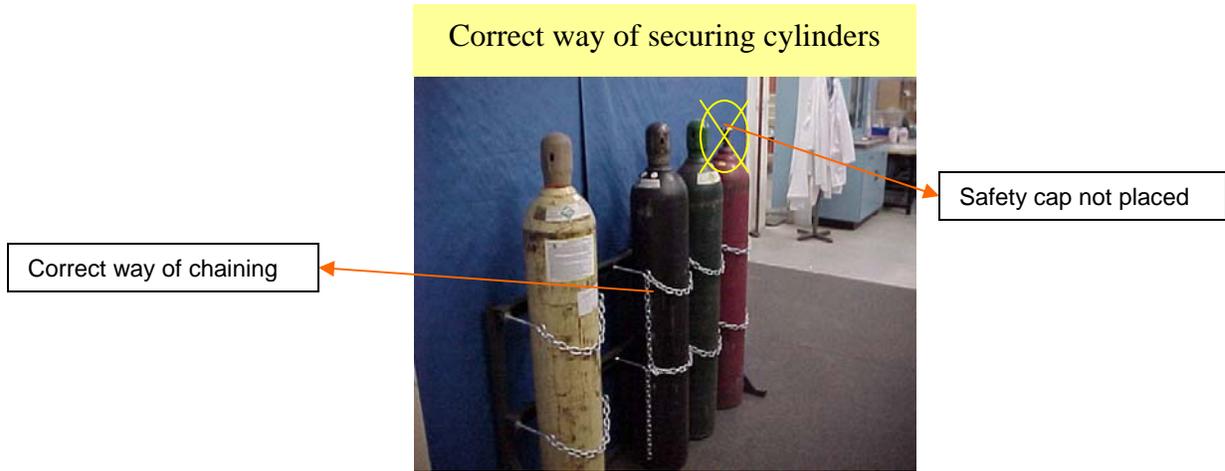
### **Safety Tips on Gas Cylinder Storage and Handling**

1. UCLA policy requires that compressed gas cylinders be double chained to a stable structure such as a wall. The first chain should be one third from the bottom of the cylinder and the second chain should be one third from the top of the cylinder. Do not strap the cylinders and secure. Do not use table/bench clamps for securing the cylinders. Replace the straps with chains. Contact facilities at x59236 and submit an FSR or visit <http://www.fsr.ucla.edu/> UCLA policy requires that double chains be used to secure a maximum of three cylinders clustered together. Secure cylinders of equal sizes together to avoid chaining problems.

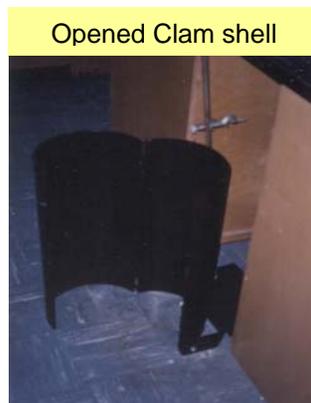


2. Never store the cylinders on the transportation carts.
3. Liquefied fuel-gas, shall be stored in an upright position, according to 8 CCR 4650(e). (**Note:** Only exception being, unless the cylinder is designed for use in horizontal position with proper securing)

4. "Empty" lecture bottles may contain residual gas and are not truly empty. Complete a UCLA on-line hazardous waste tag for the cylinders and bring them to the designated EH&S hazardous waste pick up location.
5. Regulators must be removed from the cylinders when not in use and replaced with the safety cap.



6. Cal/OSHA regulation T8 1740(g) requires that, oxygen cylinders in storage be separated from fuel-gas cylinders or combustible materials (especially oil or grease) by a minimum distance of 20 feet or by a noncombustible barrier at least five feet high and with a fire resistance rating of least one-half hour. Section 4650 requires the barrier to be at least 18 inches above the tallest cylinder. To meet the regulations, some employers have been affixing five-foot sheet metal partitions on carts between the two cylinders.
7. **NOTE:** Portable service or intermittent use allows welding cylinders (Oxygen and fuel cylinders) to remain on carts. Multiple welding cylinders or welding cylinders on carts that are no longer in use or rarely used should be stored according to section 1740(g)."
8. Never force the cap or regulator. The cap should only be hand tight.
9. Use "Clam Shell" where ever feasible. It is a cylindrical casing which allows you to secure the cylinder next to your experimental setup or work bench in the lab.



**Note:** For all *small gas cylinders* and specifically for those which require to be placed within the fume hood, use a frame casing (similar to clam shell) as shown in the pictures below:

Frame Casing (Clam Shell)



Within a Fumehood



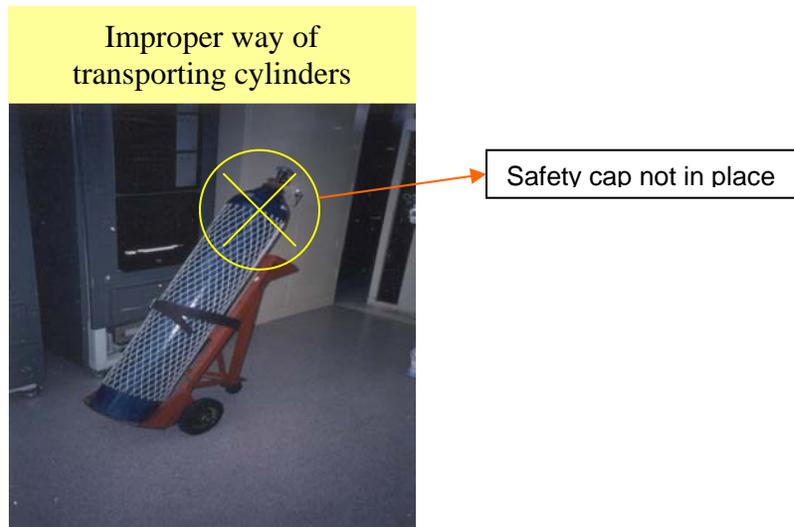
Next to Experimental Setup



10. Cylinders should not be exposed to excessive dampness, or to corrosive chemical or fumes.
11. Gases are not to be transferred from one vessel to another (except dry ice and cryogenic material). Never try to refill compressed gas cylinders by yourself.
12. Before using a cylinder, slowly “crack” the valve to clear dust or dirt. Make sure that the opening is not pointed towards anyone. Additional precautions must be taken when toxic or flammable gas cylinders are used. Do not stand in front of the regulator gauge glass when opening the valve.
13. Never use a cylinder without a regulator. Always use the correct pressure regulator.
14. After attaching the regulator, and before the cylinder is opened, check the adjusting screw of the regulator to see that it is released. Never permit the gas to enter the regulator suddenly.
15. Never try to stop a leak between a cylinder and regulator by tightening the union nut unless the valve has been closed first.
16. Never strike an electric arc on the cylinder.
17. Never use a leaking, corroded or damaged cylinder. Remove the cylinder from service and contact the supplier for return.

## Transportation of cylinders

1. Move gas cylinders with the safety cap in place and using the two wheeled transportation cart designed for this purpose. See to it that the transportation cart has straps or chains to secure the cylinder.



2. Avoid dropping and striking the cylinders together. The cylinder should not be lifted by cap.
3. Use a cradle for hoisting, never a lifting magnet or sling.
4. Avoid dragging, sliding or rolling cylinders.
5. While transporting a filled gas cylinder, use the freight elevator when possible. If there is no freight elevator, do not use an elevator with people in it and do not allow other people to enter the elevator when transporting the cylinders.

## Glossary

**Note:** Many gases exhibit more than one hazard. In the examples quoted in this section, to provide the best protection to the user, most severe hazard of a gas has been designated with a (P) for Primary. Any additional hazards for which additional precautions are recommended have been designated with an (S) for Secondary.

**Asphyxiating gas:** Is usually inert, that may cause suffocation by displacing the oxygen in the air necessary to sustain life.

**Examples:** Acetylene (S), Argon (P), Carbon Dioxide (P), Ethane (S), Helium (P), Hydrogen (S), Liquid Nitrogen (P), Methane (S), Nitrous Oxide (P), Propane (S), Sulfur Hexafluoride (P)

## Compressed gas

A gas or mixture of gases having an absolute pressure exceeding 40 psi at 70 degrees F (21.1 degrees C) or,

A gas or mixture of gases having an absolute pressure exceeding 104 psi at 130 degrees F (54.4 degrees C) regardless of the pressure at 70 degrees F, or,

A liquid having a vapor pressure exceeding 40 psi at 100 degrees F (37.8 degrees C)

**Corrosive Gas:** A gas that causes visible destruction of, or irreversible alterations in living tissues by chemical action at the point of contact or which has a DOT label Corrosive.

Examples: Ammonia (P), Chlorine (S)

**Cryogenic fluid:** A refrigerated liquefied gas having a boiling point colder than - 90 deg C (- 130 deg F) at 14.7 psi absolute, or which DOT requires the label of non-flammable, nonpoisonous compressed gas including - compressed gas, liquefied gas, pressurized cryogenic gas, compressed gas in solution, asphyxiating gas and oxidizing gas.

Examples: Ammonia (S), Ethane (S), Liquid Nitrogen (S), Propane (S).

**Flammable gas:** A gas which, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less, or a gas which at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit, or one for which the DOT requires their red flammable gas label.

Examples: Acetylene (P), Ammonia (S), Arsine (S), Carbon Monoxide (S), Ethane (P), Germane (S), Hydrogen (P), Methane (P), Propane (P), Silane (P).

**Oxidizer gas:** A gas that is nonflammable but can support and vigorously accelerate combustion in the presence of an ignition source and fuel or is labeled by the DOT as oxidizer.

Examples: Compressed air (S), Chlorine (S), Nitric Oxide (S), Nitrous Oxide (S), Oxygen (P).

**Toxic gas:** a gas that has a lethal concentration (LC 50) in air of 2000 ppm or less by volume of gas (Highly Toxic has an LC 50 of 200 ppm or less) or gas that required DOT label poison.

Examples: Arsine (P), Carbon Monoxide (P), Chlorine (P), Germane (P), Nitric Oxide (P).

