## Standard Operating Procedure

# **Compressed Gases**

## Overview

Chemicals in this category present hazards based on one or more of these characteristics:

* Pressurization
* Oxidizing ability
* Flammability\*
* High Toxicity\*

Many compressed gases are also considered to be simple asphyxiants due to their ability to displace oxygen in the event of a rapid release.

**\*Highly toxic and pyrophoric gases are some of the most dangerous materials found in the laboratory. A gas-specific Standard Operating Procedure must be developed for these materials in conjunction with the campus Chemical Hygiene Officer***.*

## Special Handling and Storage Concerns

**Personal Protective Equipment**

* Traditional white lab coat.
* Nitrile or neoprene gloves are adequate for possible incidental exposure.
* ANSI Z87.1-compliant safety glasses.

**Special Storage Requirements**

*Proper mounting of gas cylinders is imperative*. Follow all mounting requirements as described in the UC Santa Barbara Chemical Hygiene Plan Chapter 3, section ‘Chemical Inventory, Storage and Transport’.

*Corrosive gases*: Store lecture bottles 6 months or less, cylinders 2 years or less.

*Oxidizing gases*: Store with 20 feet separation from, or non-combustible partition between extending not less than 18 inches (457 mm) above and to the sides of the stored material, *flammable gases*.

**Engineering Controls**

*Oxygen sensors*: May be necessary in rooms where large quantities of compressed gases are stored or handled, or in areas with limited ventilation (closets, cold rooms).

*Carbon monoxide sensors:* Required for carbon monoxide use if the cylinder or any plumbing are outside of a fume hood or gas cabinet.

**Special Handling Considerations**

Be cautious when handling compressed gases in poorly ventilated areas such as cold rooms.

Inspect cylinders and valves for corrosion or other damage on a regular basis.

Transport:

* Disconnect regulators and other apparatus prior to transport.
* Always replace the valve safety cap before transporting cylinders.
* Cylinders must always be transported using a hand truck or cart designed for that purpose.
* Transport cylinders upright.

When transporting compressed gases on elevators, use service or freight elevators when available. In addition, when transporting compressed gases by elevator:

* Post a sign reading “DO NOT ENTER – GAS TRANSPORT” to exclude passengers. Send the elevator to the desired floor, but do not enter the elevator yourself.
* 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.

Plumbing:

* Regulators
	+ Specific to certain gas types, identified by the Compressed Gas Association (CGA) number. CGA valve outlet connections are identified by a 3-digit number relating to the rated or maximum cylinder pressure at which the connection is designated to be used, the gas type, and a designation of the valve outlet thread when applicable.
	+ May be back-threaded (e.g.H2 regulators) to reduce possibility of mismatch.
* Tubing
	+ Tubing material must be compatible with the gas type.
	+ Flexible polymer tubing (Tygon, silicone, rubber) is not appropriate for permanent experimental set-ups. They should also never be used for flammable, pyrophoric, toxic, or highly toxic gases.
	+ Fittings designed as metal-on-metal systems (e.g.Swagelok) must be used as designed. Do not use grease or Teflon tape on these connections.

## First Aid and Emergencies

**Uncontrolled Release**

In the event of an uncontrolled release, assume that an oxygen deficient atmosphere is present. Notify others in the area and evacuate the room until adequate oxygen levels can be confirmed.

**Personnel Exposure**

Move person to fresh air only if safe to do so. *If you suspect that a person has lost consciousness due to oxygen deprivation, call 911 and do not enter the room*. If symptoms persist, seek medical attention.

## Laboratory Specific Information

**Prior Approval Required**

[ ]  **NO**

[ ]  **YES (describe):**

**Designated Area**

[ ]  **Entire Laboratory Area**

[ ]  **Other (describe):**

**Experimental Conditions of Use**

**Temperature Range:**

**Pressure Range:**

**Scale Range:**

**Other Relevant Details:**