







Issued: May 2020

Compressed gas cylinders encompass a wide class of hazards-both physical and chemical. Due to high pressure inside the cylinders, they can be propelled with force that can cause extreme injury. Even with the pressure contained, the sheer weight of the cylinder can be dangerous to the body and as it will be discussed below, different gases may have several hazardous chemical properties.

Types of Compressed Gases	Non-liquefied - also called compressed gases or permanent gases. They do not become liquid when they are compressed at normal temperatures, even at very high pressures. Examples: Oxygen, Nitrogen, Helium, Argon
	Liquefied - can become liquids at normal temperatures inside cylinders under pressure. Examples: Anhydrous Ammonia, Propane, Butane, Propylene, Carbon Dioxide
	Dissolved - chemically very unstable and can explode even at atmospheric pressure. The cylinders are usually packed with inert, porous filler saturated with acetone or other suitable solvent. Examples: Acetylene
	Cryogenics - are liquefied gases that are kept in their liquid state at very low temperatures. These gases must be cooled below room temperature before an increase in pressure can liquefy them, and therefore have two properties in common: they are extremely cold, and small amounts of liquid can expand into very large volumes of gas. Examples: Liquid Oxygen, Liquid Nitrogen





Hazards of Gases	 Flammables – gases that ignite on contact with heat source.		Asphyxiants – gases that displace oxygen in the air (less than 19.5% of oxygen) causing suffocation.
	 Oxidizers – gases that react with oxygen and oxidizing gases to produce heat or an explosive reaction.		Toxics – poisonous gases. *Must notify Campus Fire Marshall or EH&S prior to purchase of toxic/poisonous gases.
	 Pyrophorics – gases that spontaneously ignite on contact with air.		Corrosives – gases that cause skin or eye burns or irritation on contact or exposure.

Dry Ice

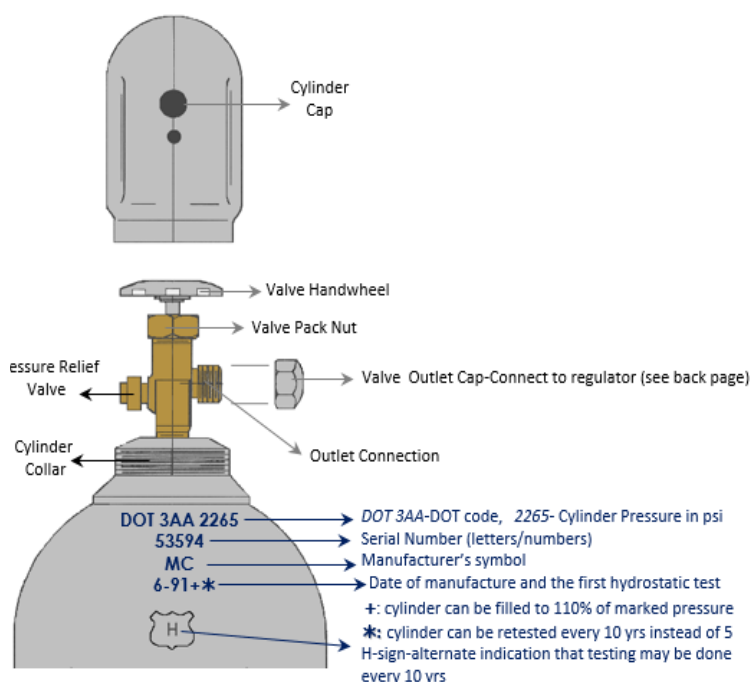
- Sublimates directly to CO₂
- Can displace oxygen
- Use in well ventilated areas
- Wear PPE and avoid skin contact



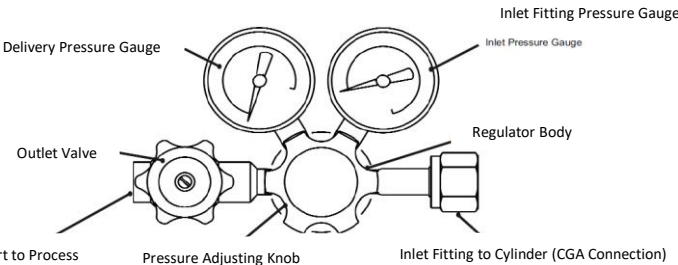
*Many gasses carry multiple hazards. Know all applicable gas hazards beyond the cylinder labeling.

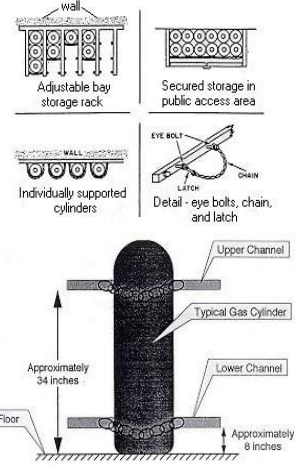
Personal Protective Equipment		Eye and face protection <ul style="list-style-type: none"> • Safety Glasses or Goggles • Face Shield
		Non-absorbent, loose fitting gloves <ul style="list-style-type: none"> • Leather Gloves • Cryogenic Gloves
		Proper clothing <ul style="list-style-type: none"> • Long Sleeve Lab Coat/Apron • Long Cuff-less Pants
		Closed-toed shoes <ul style="list-style-type: none"> • Steel-toe Shoes

Cylinder Anatomy



Compressed Gas Self-Inspection Checklist Tool:

Pre-use	<ul style="list-style-type: none"> <input type="checkbox"/> Don on proper personal protective equipment such as safety goggles, gloves, lab coats, long pants, and steel-toe or closed-toe shoes. <input type="checkbox"/> Cylinder labels are in place and legible. <input type="checkbox"/> The cylinder has been periodically tested by the manufacturer or vendor. <input type="checkbox"/> Read the Safety Data Sheets (SDS) to become familiar with the hazards of the contents of the cylinder. <input type="checkbox"/> No visible damage on the cylinder such as dents, corruptions, or burns. <input type="checkbox"/> No tear on any tubing or hoses or damage to the regulators. <input type="checkbox"/> Know the location of your emergency eyewash and showers, fire extinguishers and evacuation routes.
Storage	<ul style="list-style-type: none"> <input type="checkbox"/> Cylinder caps are in place when not in use. <input type="checkbox"/> Cylinders are stored upright in racks or double chained. <input type="checkbox"/> Cylinders are secured with non-combustible material, such as chains or metal racks, on the bottom and top third of its height. <input type="checkbox"/> Cylinders are not blocking or obstructing any exits or pathways. <input type="checkbox"/> Cylinders are stored away from excessive heat, continuous dampness, corrosive chemicals instead store in dry, cool, well-ventilated areas. <input type="checkbox"/> Separately store incompatible gases such as, <ul style="list-style-type: none"> • Oxygen and fuel gases (minimum of 20ft distance or separated by fire-resistant partition); • Corrosive gases and flammable substances such as gasoline, oil • Full and empty cylinders. <input type="checkbox"/> Empty cylinders are labeled or tagged. The cylinder is considered empty at 25psi; never empty all the way to zero. <input type="checkbox"/> Place toxic and corrosive gas cylinders in approved cabinets.
Transport	<ul style="list-style-type: none"> <input type="checkbox"/> Ensure the regulator is detached. <input type="checkbox"/> Valves are tightened, closed, and covered with cap. <input type="checkbox"/> Use proper material handling equipment such as hand carts with chain links to secure cylinders when transporting even at short distances. <input type="checkbox"/> Keep the cylinder close to upright position not horizontal.
Regulator Installation	<ul style="list-style-type: none"> <input type="checkbox"/> Use an approved regulator wrench when opening and closing valves. <input type="checkbox"/> Install regulator with compatible pressure rating and gauge range and only install with correct CGA fitting. <div style="text-align: center; margin: 10px 0;">  </div> <ul style="list-style-type: none"> <input type="checkbox"/> Ensure there is no debris, grease, or contaminant in the cylinder outlet connection. <input type="checkbox"/> Inspect for damage to the regulator CGA connection. <input type="checkbox"/> If the CGA connector of the regulator is designed to have a washer, replace with new washers when changing cylinders. <input type="checkbox"/> The regulator is tightly connected without any use of a plumbers tape. <input type="checkbox"/> Once the regulator is installed, close the outlet valve before slowly turning on the valve to a turn and a half. <input type="checkbox"/> Apply leak-detection liquid (such as Snoop) to find leaks. <input type="checkbox"/> Turn the pressure adjusting knob until it reach the desired pressure.



In case of a cylinder leak:

- Never conduct your own repair of any cylinder leaks. If handling of a leaking cylinder could be done in a safe manner, move the cylinder in a well-ventilated and isolated area away from any combustibles, ignition sources, and other flammable materials.
- If leak becomes uncontrollable and there is risk of hazardous material release, call 911 and stay with on the call until the first responders arrive at the scene.
- Have the supplier or vendor contact information to provide to the first responders.
- Emergency evacuation and response procedures must be put in place and practice.

Compressed Gas Safety

REFERENCE GUIDE

I have reviewed and understand the contents of this document.

Name (print)	UCInetID	Signature	Date