Cryogen Safety

What are Cryogens?

A cryogenic liquid is a liquid with a normal boiling point below -240°F. Argon, helium, hydrogen, nitrogen, and oxygen are the most commonly used industrial gases that are transported, handled, and stored in the liquid state at cryogenic temperatures. This is a quick reference guide only, please refer to the Chemical SOP for more detailed information.

What are the Hazards of Working with Cryogens?

- **Extreme Cold:** Cryogenic liquids, as well as their associated cold vapors and gases, can have a thermal burn-like effect on the skin. Brief exposure can irritate delicate tissues, like the eyes. Prolonged skin exposure can result in cold burns and frostbite.
- **Asphyxiation:** When cryogenic liquids combine to form a gas, the resulting gas is extremely cold and usually heavier than air; even if the gas is not toxic, it displaces air. Oxygen deficiency (also known as asphyxiation) can be fatal and poses a significant risk in confined spaces.
- **Toxicity:** Each gas can cause specific health effects. Consult the SDS for information on the toxic hazards of a particular cryogen.
- **Adhesion:** When exposed to cryogenic temperatures, plastic, carbon steel, and rubber can become brittle and break.
- **Physical Hazard:** Without adequate venting or pressure-relief devices, pressure can build up and pose serious physical hazards, including explosions.
- **Flammability:** Flammable gases, such as hydrogen, methane, carbon monoxide, and liquefied natural gas, can burn or explode, so keep them away from potential ignition sources.

Safety Precautions for Working with Cryogens

- Store cryogens in well-ventilated locations.
- Cryogenic liquids should not be used in confined spaces or spaces without adequate ventilation (e.g., cold rooms or closets).
- Pressure relief valves must always be operable and unobstructed.
- Avoid bringing combustibles into contact with liquid oxygen or an oxygen-rich atmosphere.
- Never touch uninsulated pipes or containers containing cryogenic liquids.
- When dispensing or transferring cryogenic liquids, use gloves designed specifically for cryogenic liquids. Immersion can result in frostbite or permanent tissue damage, so these gloves are only intended for incidental contact. Inspect gloves for holes or tears on a regular basis, and discard damaged ones.
- Wear a face shield and other appropriate PPE when dispensing or transferring cryogens.

References

- Oregon State University EHS: Cryogenics
- University of Texas at Austin EHS: Cryogens
- SJSU Chemical Hygiene Plan
- UC Berkeley EHS: Cryogenic Liquids

Need Help?

- Ask the lab/shop supervisor
- Ask the department/college safety staff
- Ask SJSU Environmental Health & Safety
  - Chemical Hygiene Officer: skye.kelty@sjsu.edu; 408-924-1978
  - Director: ehs@sjsu.edu; 408-924-1969