



SAFELY USING CRYOGENIC LIQUIDS



Potential Chemical Hazards

- Displacement of oxygen
- Flammable
- Toxic
- Corrosive and/or irritating
- Oxidizing
- Explosive
- Health hazard



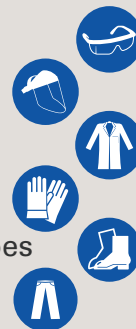
About Cryogenics: A cryogen or cryogenic liquid is generally defined as any liquid with a boiling point below approximately 120 K (-153°C or -248°F) at 1 atmosphere of pressure (NIST). Cryogenics have very large liquid-to-gas expansion ratios and can undergo flash vaporization to quickly fill the surrounding area.

The most encountered cryogenics are liquid nitrogen, liquid argon, liquid helium, liquid hydrogen, and liquid oxygen. At Iowa State University (ISU), liquid nitrogen is the most frequently used cryogenic.



Personal Protective Equipment (PPE)

- Eye protection
- Face shield
- Lab coat
- Cryogenic gloves
- Fully-enclosed shoes
- Full-length pants



Physical Hazards:

Heavy dewars and cylinders can cause crush injuries.



General Safety Guidelines



Read the safety data sheet to understand the specific hazards of the cryogen in use.



Only use containers and equipment designed for refrigerated or cryogenic liquids.



Avoid transporting cryogen dewars alone, and choose the smoothest route to minimize risk of tipping.

First Aid in the Event of a Skin Exposure

- ▶ **Seek medical assistance immediately!** ◀
- Remove any clothing that is not frozen to the skin.
- Do NOT rub the frozen skin as tissue damage may result.
- Place affected body part in warm water bath (not above 40°C/ 104°F). Do not use dry heat.

Cryogenic Liquid Hazards:

- Frostbite/cold burns.
- Overpressure/container rupture during rapid expansion.
- Oxygen displacement during rapid expansion.
- Nitrogen and Helium can condense oxygen from ambient air, creating an explosion hazard.

NEVER

- Store cryogenics in confined areas; rooms without ventilation, walk-in freezers, environmental chambers, or in sealed containers at temperatures above their boiling points.
- Place cryogenic liquids in sealed, non-vented containers.
- Ride in an elevator with a cryogenic liquid container.
- Consume or directly touch cryogenic liquids.
- Wear jewelry, watches, or other similar items when handling cryogenic liquids.

Recommended EH&S Online Training for All ISU Cryogenic Liquid Users: Laboratory Safety: Compressed Gas Cylinders