

# Cryogenics

## Description

A **cryogenic liquid** is defined as a liquid with a normal boiling point below -240°F (-150°C, 123°K). The most commonly used industrial gases that are transported, handled, and stored in the liquid state at cryogenic temperatures are argon, helium, hydrogen, nitrogen, and oxygen. There are a number of general precautions and safe practices that must be observed because of the extremely low temperatures and high rates of conversion into gas of all the cryogenic liquids. There are also specific precautions that must be followed where a particular liquid may react with contaminants or may present other hazards associated with that particular product such as asphyxiation or flammability.

As always, end users should have and be thoroughly familiar with the SDS for their specific product. All operators must be familiar with the instructions provided with the equipment to be used with the cryogenic liquid.

## Hazards

- Extreme cold: can cause instant extreme frost bite to exposed skin or eyes.
- Asphyxiation: can immediately displace oxygen, especially in poorly ventilated areas
- Expansion: cryogenics, such as liquid nitrogen, can expand up to 700x when changing from liquid to gas. Rapid changes in temperature can result in tank or vessel explosions.

## Minimum PPE

The required apparel and PPE for handling cryogenics include:

- Full face shield over safety glasses
- Long sleeve shirt or lab coat
- Loose fitting thermal insulated or leather gloves (these are not the same as heat gloves!)
- Pants without cuffs that can trap liquid next to your body.
- Closed toe shoes that cover the entire foot.

## Training

EH&S offers a recommended Liquid Nitrogen Training found on MyTraining under the course code **UF\_EHS866**. The course covers the following topics:

- The hazards associated with liquid nitrogen,
- Parts of a liquid nitrogen tank including the safety features,
- Safely dispensing liquid nitrogen and handling cryogenic tubes,
- Safely transporting liquid nitrogen within a building,
- Other cryogenic liquids requiring additional safety considerations.