Cryogenic Liquid Safety

The use of cryogenic liquids in laboratories presents many unique health and safety issues. As defined by the National Bureau of Standards, a cryogenic liquid is a liquid with a normal boiling point below -238°F (-150°C). Nitrogen, oxygen, helium, carbon monoxide, hydrogen, and neon are all examples that could be found on a university campus.

All cryogenic liquids have properties requiring special precautions; they are usually shipped in specially insulated vacuum-jacketed containers. Sometimes the liquids are used directly, but most often the liquid is vaporized and used as a gas.

Cryogenic liquids are extremely cold and any contact with the body will cause severe burns, and contact with uninsulated pipes or metal will result in flesh sticking and freezing to the metal, this is why all metal jewelry and watches must be removed when in contact with these liquids. Safety goggles (not glasses) along with insulated gloves, and closed-toe shoes must also be worn. Insulated tubing and pipes are recommended such as Mylar or Teflon, and special attention must be directed to prevent the condensation of oxygen in the tubes, as flammability and detonation hazards will result.

These gases are colorless and odorless which makes detection impossible when released. Upon release the produce large amounts of gas which displace the oxygen in the surrounding atmosphere and can cause an asphyxiation hazard. For this reason, cryogenic gases should be used in a well ventilated area. For example, liquid nitrogen expands by a factor of 700.

Cryogenic gases should only be dispensed and transported in well-insulated Dewar containers and flasks. These containers should be made of metal and smaller ones
for lab use, made of glass surrounded in mesh in case of an explosion. They should be capped, but only with a loose fitting cap to allow for the release of pressure build-up and to prevent air and moisture from entering.