

## GENERAL WRITTEN SOP – Cryogenics

*The OSHA Laboratory Standard explicitly requires "standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals." If the general SOP in this section do not fulfill this requirement, you must amend and append in some manner so as to comply.*

**Special Precautions for Working with Cryogenics:** *Some of the hazards associated with cryogenics (fluids used to maintain extremely low temperatures) are fire, pressure, embrittlement of materials, and skin or eye burns upon contact with the liquid. Cryogenics can condense nearly pure liquid oxygen from the air, creating a severe fire risk. A pressure hazard exists because of the large expansion ratio from liquid to gas, causing pressure build up in containers. Many materials become brittle at extreme low temperatures. Brief contact with materials at extreme low temperatures can cause burns similar to thermal burns. Carefully observe all special precautions.*

1. Equipment should be kept clean, especially when working with liquid or gaseous oxygen.
2. Mixtures of gases or fluids should be strictly controlled to prevent formation of flammable or explosive mixtures.
3. For flammable cryogenics the precautions provided in the "Flammable/Combustible Materials" section of this plan should be used.
4. Always wear goggles when handling cryogenics. If there is a splash or spray hazard, a face shield over the goggles, an impervious apron or coat, cuffless trousers, and fully-covering, non-lacing shoes should be worn. Watches, rings, and other jewelry should not be worn. Gloves should be impervious and sufficiently large to be readily thrown off should a cryogen be spilled. Cryo-gloves or pot holders should also be used. Respirators may be required if the cryogen is toxic and sufficient local exhaust ventilation is not available. Contact EHS (953-4816) for exposure monitoring and/or enrollment in respiratory protection program.
5. Containers and systems containing cryogenics should have pressure relief mechanisms.
6. Containers and systems should be capable of withstanding extreme cold without becoming brittle. Glass containers should be taped solidly around the outside or encased in plastic mesh.
7. Funnels should not be used for pouring liquid nitrogen or any other cryogen.
8. Large mobile Dewars or LN2 refrigerators (or the trolleys carrying these) used for transporting cryogenics within a building or between buildings should be equipped with a braking mechanism.
9. Large mobile Dewars at risk for tipping should be transported on appropriate carts. Wheeled trolleys may not be used if the vessel must pass over elevator thresholds or other slots/crevasses wider than 25% of the wheel width.
10. Dispensing stations designed to allow research staff to fill smaller vessels from a larger self-pressurizing Dewar must be located in non-public areas, and should have appropriate signage posted and SOP available.
11. Smaller vessels of liquid nitrogen or other cryogenics transported by hand within or between buildings must have a handle or bail, and must be covered.

### Liquid Nitrogen

See Compressed Gasses (pp. [118](#))