



NSLS ES&H HIGHLIGHTS



Editor: N. Gmür and A. Ackerman

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Protect Yourself When Handling Cryogenics

Cryogenics are useful tools for research conducted at the NSLS. They can freeze experimental samples to reduce thermal broadening effects and reduce radiation damage from the synchrotron beam, cool detectors to reduce thermal background, or reduce resistance to make electronic circuits superconducting. The two most frequently used cryogenics are liquid nitrogen (LN₂; -320°F) and liquid helium (LHe; -452°F). As these cryogenics warm up over time, they change from a liquid to a gas and expand in volume some 700 fold; thus one of their hazards is as asphyxiants, i.e. they displace oxygen. Rapid conversion from liquid to gas can result in significant pressure generation if contained in a sealed system.

An additional hazard is that cryogenics can quickly freeze exposed skin, mucous membranes, eyes, etc. Earlier this year a researcher was handling LN₂-cooled vials and was initially wearing Personal Protective Equipment (PPE) which included an inner pair of thin cotton gloves and an outer pair Purple Nitrile® gloves (eye protection was not worn, and should have been). At one point, the outer pair of gloves was removed to allow better use of a keyboard. When once again handling the vials, now with just the cotton gloves, the researcher reached into a small dewar filled with LN₂ to attach some vials to a cane and inadvertently inserted two fingers of one hand into the liquid for a few seconds; the cotton gloves could not protect this individual and also wicked the LN₂ into close contact with the skin. Upon removal, the researcher experienced pain and numbness in the now frozen finger tips. Colleagues assisted and ran room temperature water over the fingers, informed Control Room personnel who called x2222, and a BNL ambulance transported the researcher to a local hospital. At the hospital, blood circulation in the fingers was confirmed and the use of an anti-bacterial cream was recommended. In a few hours, the pain and numbness subsided, leaving a blister on one finger tip as the only visible injury and that too healed over the next few days.

This person was lucky that more severe injury did not occur. Quick action by all concerned resulted in a fortunate outcome. The incident points to the need for careful handling of cryogenics and the use of proper PPE. This includes:

Handling of cryo-cooled objects and working in small hand-held dewars:

- Goggles or safety glasses with side-shields
- Inner cotton gloves and outer Purple Nitrile® or vinyl gloves

Working with large dewars, filling or transferring cryogenics:

- Full face shield
- Insulated or heavy duty leather gloves

Do not handle cryo-cooled objects with unprotected hands and eyes.

Do not immerse gloved hands into cryogenics – these gloves are not rated for this.

See also: [NSLS ESH Highlight #10: Proper Containers for Cryogenics](#)
[NSLS PRM 5.1.0 Cryogenic Liquids: Storage Usage and Handling](#)
[NSLS General Cryogenic Work Job Risk Assessment](#)
[BNL SBMS Cryogenics Safety Subject Area](#)