

Safetygram

NCI-Frederick

ISM-176

Laboratory Personnel

February 2013

Safe Handling of Liquid Nitrogen

Liquid Nitrogen (LN₂) is used abundantly at FNL. Employees working with LN₂ must follow safe work practices and wear appropriate personal protective equipment (PPE) to reduce the potential for accident or injury while transporting, storing, transferring, and using LN₂.

Since LN₂ tanks weigh nearly 500 pounds, employees must use a special cart designed for moving the tanks and also wear leather gloves and steel-toed safety shoes to avoid hand and foot injuries. Load tanks on the cart so that the pressure relief vent is directed away from the handler. Ensure that tanks are fully secured to the cart with the hook fully engaged before moving the tank. Get assistance if needed to avoid back injuries or other physical injuries that may be caused by moving the tanks. Eye protection must be worn when transporting LN₂ tanks.

For assistance with delivery and removal of your program's LN₂ tanks please contact the Receiving Warehouse at x1172 or the Supply Warehouse at x1176.

At a temperature of approximately -196° C (-320°F), LN₂ will freeze tissue on contact and cause plastics and rubber to become brittle. Only containers specifically designed for use with cryogenic liquids, such as Dewar flasks, should be used with LN₂. Transfer operations involving open containers should be performed slowly to minimize boiling and splashing of the LN₂. Appropriate PPE for open transfer operations would include insulated gloves with long cuffs, face shield and goggles, and a fully fastened lab jacket.

As LN₂ evaporates, it expands to a volume nearly 700 times greater than the original volume of the liquid. Therefore, transfer operations should be conducted in well-ventilated areas to prevent the displacement of atmospheric oxygen by nitrogen gas. LN₂ expansion can also cause sealed containers to explode. Never transfer LN₂ into any container that is not designed for use with cryogenic liquids.

Another hazard associated with LN₂ is the potential to concentrate oxygen in or near a cryogenic freezer. Since oxygen boils at a higher temperature than LN₂ (-183° C), the LN₂ can condense oxygen out of the air. The liquefied oxygen can be absorbed into the LN₂ or condensed on a poorly insulated container. This oxygen-enriched environment creates a serious fire hazard. Therefore, prolonged storage of LN₂ must be minimized, and oxidizable materials must be kept away from cryogenic storage containers.

When proper handling procedures and PPE are used, contact with LN₂ is rare. In the unlikely event of contact with LN₂, immediately contact OHS at x1096.

Any comments or questions regarding the safe use and handling of LN₂, or any other cryogenic liquid, should be directed to EHS at x1451.

Resources:

<http://home.ccr.cancer.gov/lop/intranet/PolicyManual/GeneralSafety/liquidnitrogen.asp>

<https://www.osha.gov/Publications/laboratory/OSHAquickfacts-lab-safety-cryogenics-dryice.pdf>