

Standard Operation Procedure: Le Conte Liquid Nitrogen Dispenser System, Cryogen Handling and Transport

Hazard:

- Liquid nitrogen is colder than -196C and can cause severe burns and tissue damage (such as frost bite). Moving liquid or a jet of vapors can freeze the skin or eyes faster than liquid contact. Because eyes contain fluids they are especially sensitive to cryogen exposure. The fluids in the eye can freeze upon contact with the cryogen, causing permanent eye damage.
- Liquid nitrogen (LN2) vaporizes as it is dispensed from the compressed tank at the rate of 700 liters of gas per liter of liquid. This “boil-off” can cause replacement of air in the room, which can cause an oxygen deficient atmosphere (<19%O₂). Oxygen deficient atmospheres can lead to asphyxiation.
- Pressure build-up and explosions can occur if the liquid nitrogen is trapped and rapidly brought to room temperature. Store LN2 in insulated dewars with pressure relief valves.

Protective Equipment:

- Wear protective gloves. Gloves should be loose and easy to remove; be sure to remove or cover jewelry as it can freeze to skin
- Protect eyes by wearing safety glasses or goggles, and protect the face with a face shield
- Wear long pants and closed toed shoes, recommend wearing long sleeve shirt or lab coat

Special Handling Precautions for dewars:

- Avoid contact with cryogenic liquid. Wear personal protective equipment.
- You must provide your own PPE for dewar dispensing.
- Dispense, store, transfer and use in well-ventilated area.
- Make certain all valves are off before changing tanks.
- Systems that may become pressurized must have pressure relief valves.
- Transport dewars in service elevators if available. Place appropriate signage on dewar while transporting in elevators. Signs are available here:
http://physics.berkeley.edu/sites/default/files/_/filedepot/BuildingServices/cryo_sign2.pdf
- 2 persons rule applicable while transporting dewars on casters.

Disposal:

- Small amounts can be disposed of in a well-ventilated, non-public place, preferably outdoors. Air is approximately 79% Nitrogen.

Emergency Procedures:

- In case of skin burns, immediately immerse the frozen area in a warm water (not to exceed 105 F). Treat as a burn and seek medical attention.
- If splashed in eye, flush with warm water and seek immediate emergency medical attention.
- If big spill on body, get cloths off fast; immerse affected areas in warm water.

Spill Procedures:

- Less than 100 ml: In a well-ventilated area, allow to simply evaporate
- Move all personnel away from the direct area of spillage to prevent any chance contact with the spill.
- More than 100 ml: Because of the rapid conversion of even a small amount of LN2 into a large volume of gaseous nitrogen (a 700-fold expansion), any enclosed area may rapidly be depleted of all oxygen, leading to asphyxiation and death. ALL personnel must be IMMEDIATELY EVACUATED from the surrounding area.
- If a tank of LN2 is leaking and valves cannot be shut, carefully move the tank outside where the leaking gas will not cause asphyxiation. Contact the vendor of the gas or cylinder to repair the leak.

Requirements/Access:

- PI must sign a completed LN2 access form and Safety Coordinator indicating in person training on dispenser system has been complete.
- Complete EHS Cryogenics safety training via UC Learning Center.
- Submit the certificate with completed LN2 access request sheet in to the service desk in 151 Physics North

After documents submitted, service desk will issue a code to activate dispenser and door to LN2 shed. Service desk will also activate your Cal ID for the loading dock door so you may fill LN2 after 4pm. This is a personal code. Sharing of the code is prohibited and shall result in loss of access. Undergrads are not permitted to use LN2 systems.

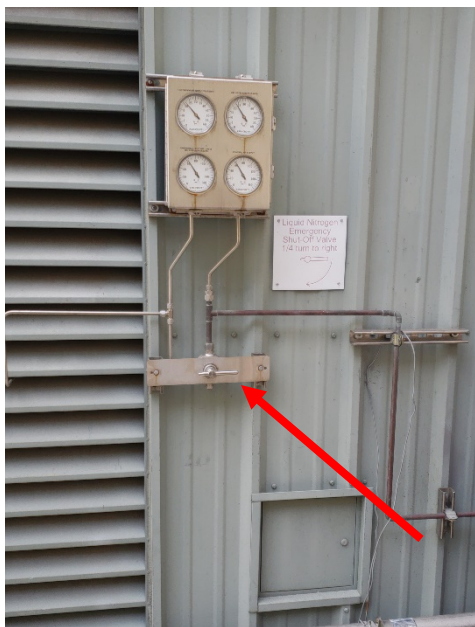
DO NOT SHARE LN2 ACCESS CODES. Access codes validate a user has had training and lets the department audit transactions. If persons are found out sharing codes the code owner may lose access to the LN2 dispenser.

Emergency Shut off

There are two emergency shut offs for the station. The large scale has a large red stop button that can be pressed in the event the system continues to dispense after being filled.



The second emergency stop is a valve that is outside of the station located next to the gauges in the storage shed. The second stop will turn off the supply of LN2 to the entire system and should be used if the small scale doesn't stop after being filled.



Transport Requirement:

2 PERSONS ARE REQUIRED TO TRANSPORT ALL DEWARS (fully or empty) ON CASTERS. This includes to and from the Liquid Air Plant in Chemistry and within the Physics complex. Dewars transported on carts are acceptable to transport solo within the Physics complex. If somebody in your lab is not available to assist with transport you may ask for help from Anthony in room 158 or Carlos in 151 during business hours.

HANDLING A LARGE DEWAR ON CASTERS BY YOURSELF WILL LIKELY RESULT IN A DEWAR TIP, SPILL OR OTHER ACCIDENT

Operators that require dewars to be transported in elevators must place a sign on the dewar warning potential elevator passengers of the hazard. An example of the sign can be found here: http://physics.berkeley.edu/sites/default/files/_/filedepot/BuildingServices/cryo_sign2.pdf

Please use a threshold tool (photo below) to place in the elevator during transport. This tool will greatly reduce the chance of a dewar caster from being caught in the elevator door. If you use the tool make sure to return it back to the shed.



Small Scale-

- Wear required PPE for scale (gloves, pants, shoes and face shield).
- Inspect your dewar. Make sure dewar isn't damaged or leaking.
- Do not leave the small scale while dispensing. Small scale can fill quickly.
- Dewars larger than 4L will not fit on scale.
- Report issues to Anthony Vitan or person at 151 Le Conte Service Desk

Large Scale-

- Wear required PPE for scale (Pants, gloves, shoes).
- Inspect your dewar. Make sure it is in good working condition per manufacturer's specifications.
- You may leave your large dewar while it is filling.
- Depending on line temperature dewars may take up to an hour to fill.
- Report issues to Anthony Vitan or person at 151 Le Conte Service Desk