



Laboratory Safety Fact Sheet: Liquid Nitrogen

The fact sheet below gives hazard information and precautions for the use of cryogenic liquid nitrogen (LN₂) in laboratory settings.

Liquid Nitrogen

Liquid nitrogen (LN₂) is nitrogen gas cooled and compressed to a liquid at -196°C (-321°F). It is colorless, odorless, and expands to gas (1 liter of LN₂ = ~700 liters of nitrogen gas at room temperature).

Hazards

Extreme Cold	-Can cause severe frostbite or cold burns on contact with skin or eyes -Materials exposed to LN ₂ can become brittle and shatter
Asphyxiation	-Displaces oxygen in the air when it vaporizes -Risk of oxygen deficiency in poorly ventilated or enclosed spaces
Pressure Build-Up	-Rapid evaporation can cause pressure build up in sealed containers -Explosion hazard if not properly vented
Cryogenic Spill	-Cold vapor can obscure vision and pose slip hazards -May lead to material failure in incompatible equipment
Ice Build-up	-Frost on LN ₂ cryogenic hardware is often an indication of continuous overflow or loss of vacuum -Do not use when ice is present
Boiling and Splashing	-Can occur when filling a room-temperature container with cryogen, or when inserting room-temperature objects into a cryogenic liquid.

Safe Handling Procedures

Before starting work:

- Ensure you have received specific training on using the LN₂ or equipment containing LN₂
- Work in well-ventilated areas only.

- Put on appropriate PPE:
 - Loose-fitting and long cryogenic gloves
 - Safety glasses or goggles
 - Lab coat or long sleeves and pants
 - Closed toed shoes
- Tubing on liquid nitrogen dewar should be from the vendor – made of flex stainless steel equipped with a gas-phase separator.
- Confirm liquid and gas valves are closed upon receiving the dewars.
- Do not open liquid withdrawal valves if LN2 dewar pressure is > 22 psi.
- Verify that the pressure relief devices (e.g., valve, rupture disk) have not been compromised and do not have any build-up of ice.
- Use only dewars with pressure-relief valves or vented flasks to contain cryogenic liquids.

During work:

- Never leave a filling process unattended.
- Place the secondary container on floor when filling. Do not hold secondary container in hand when filling; there is splash potential and if contents are too heavy dropping the container could lead to exposure to liquid and an asphyxiation hazard.
- To minimize splashing during liquid filling operate the dewar on low pressure mode.
- Stand back and avoid putting head/face directly above the dewar, fill container, or other areas where cryogenic liquid is boiling off.
- Never use hollow tubes as dipsticks. Use dipsticks designed for use with LN2, or solid wood or metal to measure levels in dewar.
- Handle all cylinders, dewars and cryo-storage devices with care. Use appropriate dollies or cylinder carts as needed.

After completing work:

- Ensure the 22 psi pressure relief valve is in the OPEN position (very important).
- Ensure all valves (other than pressure relief valves) are shut after withdrawals.
- Cover portable dewars with lids supplied only by dewar manufacturer and not with tight fitting caps.
- Avoid carrying LN2 in elevator – use buddy system with separate floors.
- Store all cylinders, dewars, and storage devices upright away from heat sources and flammable materials.

Emergency Procedures

Frostbite or Contact Injury

- Remove affected clothing. Cut away clothing around where stuck to the skin.
- Rinse affected area(s) with lukewarm water.
- Do not rub affected areas or apply any ointments.
- Apply dry sterile dressing to affected area(s) including eyes, if injured.
- Seek medical attention.

Spill Response

- Do not attempt to clean up cryogenic liquid - let it evaporate.
- Alert others and evacuate to a safe distance and prevent entry.
- Contact EH&S emergency phone: 404-216-5237

Emergency Situations:

- If all the pressure relief valves on a nitrogen dewar have iced over, evacuate lab and contact your cryogenic supplier.
- If any of the pressure relief devices have been compromised, do not use dewar and contact your cryogenic liquid supplier.
- If you begin to feel dizzy or lightheaded, shut off the cryogenic liquid, close the tank, and leave the area temporarily to get some fresh air. Contact EH&S emergency phone: 404-216-5237.

Contact EHS:

For spills, exposure, equipment failure, or questions:

EHS Emergency Number: 404-216-5237

Email: lab-chemsafety@gatech.edu