

Liquid Nitrogen (LN)

1. Use of Liquid Nitrogen (LN)

- Liquid nitrogen (LN) is frequently used for the purpose of cooling.

2. Hazards Associated with Exposure to LN / Handling Precautions


- Material Safety Data Sheet (MSDS) for LN is available in the work area of use.
- Prevent all direct contact with cryogenic liquids. Cryogenics freeze tissue on contact and can cause permanent damage.
- Use only in fully ventilated areas. Nitrogen gas is colorless, odorless, tasteless and potentially lethal. It reduces the concentration of oxygen and can cause suffocation. As liquid nitrogen evaporates, the resulting nitrogen gas displaces the normal air and breathing air that is less than 18% oxygen may cause dizziness, unconsciousness and even death. *Thus, liquid nitrogen must always be stored and used ONLY in areas that are fully ventilated.*
- Handle and store LN in well-ventilated areas. LN easily displaces oxygen and poses an asphyxiation hazard.
- Never store LN in a sealed container since this can cause a rupture or an explosion. Ensure pressure relief mechanisms are open and kept clear.
- Special containers are required. Cryobiological storage containers are specifically designed and constructed to withstand the extreme temperature variances involved in handling LN. These special containers should be filled slowly to avoid the expansion stress that occurs as a result of the rapid cooling. Too much stress can damage the container.
- Do not seal the containers. Cryobiological storage containers are designed to function with little or no internal pressure. The use of any tight-fitting stopper or plug that prevents the adequate venting of gas builds up pressure that could severely damage or even burst the container. Even icing or accumulated frost can interfere with proper venting and containers should be checked for such obstructions.
- Handle containers with care. Containers should always be stored in an upright position. Tipping the container or letting it lie on its side can result in spillage and may damage the container or the materials stored in it. Walking or dragging containers could result in a partial or complete vacuum loss. For containers that cannot be easily and safely carried, a roller base can provide safe and easy movement of containers.

- Check container contents weekly. The extremely low temperature of LN provides the protection of the materials stored in cryobiological storage containers. When all LN has evaporated, the temperature inside the container will rise slowly. The rate of evaporation depends upon the age, condition and use pattern of the container. Opening and closing the container or moving it about will reduce its cooling efficiency. You should check LN levels in your containers at least weekly. If the liquid has evaporated faster than usual or if the container is covered with frost or condensation, the vacuum system may be damaged. In such instances, transfer the contents to another container and remove the damaged one from service.
- Transfer LN with care. The primary hazards of transferring liquid nitrogen from one container to another are spilling and splashing. NEVER overfill the containers.
- Use solid metal or wooden dipsticks. Because of the extremely low temperature of LN, plastic measuring devices tend to become very brittle or even shatter. NEVER use hollow rods or tubes; the gasification and expansion of the rapidly cooling liquid inside the tube will force liquid to spurt from the top of the tube. Always wear insulated or heavy gloves when measuring.

3. Liquid Nitrogen Personal Protective Equipment (PPE)

At *minimum*, PPE that should be utilized when working with cryogenics are:

- Laboratory Apparel: Wear standard laboratory apparel including a fully buttoned lab coat, long pants and closed toe shoes. Shoes should completely cover the feet.
- Face / Eye Shield: Safety glasses should be worn when handling small volumes. When pouring or transferring cryogenic liquids, splash goggles with an approved face shield must be utilized.
- Gloves: Insulated, heavy-duty leather gloves or special cryogen gloves. Loose fitting gloves are recommended so that they may be discarded quickly in the event that any liquid nitrogen splashes into them.
- Equipment: Use tongs to handle frozen objects.
- In case of accidental contact with LN, report any resulting skin/eye symptoms to a supervisor. Supervisor should refer employee to Employee Health Service and/or the Emergency Room. Additionally, Supervision is responsible for adhering to [UMHHC Policy 05-01-005 Accident Investigation and Reporting](#).

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