

College of Biological Science - Standard Operating Procedure			
Liquid Nitrogen			
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Revision:	New	Supersedes:	n/a

Purpose:

To provide procedural guidance on the dispensing and handling of liquid nitrogen.

Application:

All students and staff within CBS working with liquid nitrogen should be familiar with these procedures.

Safety Precautions:

- ⚠ Liquid nitrogen is very cold (-195°C). Splashes and spatter can cause cold burns and frostbite. Protect your face and skin, and always use gloved hands or tongs to manipulate items that have been in contact with liquid nitrogen.
- ⚠ When working with liquid nitrogen, you must wear insulated gloves and a face shield. Gloves should be loose enough that they could be removed rapidly if they came in contact with liquid nitrogen.
- ⚠ Rapid evaporation of liquid nitrogen can displace oxygen. Keep the door to the room open when dispensing liquid nitrogen from bulk storage dewars.
- ⚠ If you spill any quantity of liquid nitrogen, evacuate everyone from the area, and allow time for the ventilation system to return oxygen levels to normal.
- ⚠ Always keep liquid nitrogen in vacuum jacketed/insulated container designed for storage of cryogenic liquids.
- ⚠ To avoid explosion of pressurized containers, liquid nitrogen vessels must be equipped a means to relieve pressure (i.e. relief valves or loose fitting lid).

Notes:

- Liquid nitrogen is a hazardous material under WHMIS – containers must have a supplier or workplace label, and an MSDS must be available.
- It is not permissible for anyone to work in atmospheres with oxygen concentrations below 19.5%. Do not handle liquid nitrogen in closed or confined spaces as asphyxiation can occur quickly in small, poorly ventilated areas.

Procedure:

- **Dispensing**
 - Wear a face shield and insulated gloves when dispensing liquid nitrogen.
 - Using a wrench, affix the elbow and connecting hose to the valve labeled 'liquid' on the bulk storage tank. Do not over-tighten.
 - Ensure the phase separator is affixed to the end of the hose, and place the hose into the receiving dewar.
 - With a gloved hand, open the liquid valve slightly at first. Air pulses may occur as the hose cools – when they subside you may open the valve fully.
 - Monitor the level of liquid nitrogen in the receiving dewar. Do not fill past the base of the neck, as this can lead to failure in the insulation.
 - Fill to the desired level, then close the valve fully.

- With a gloved hand, carefully remove the hose from the receiving dewar. The hose may be very cold, so avoid striking it against anything.
- Allow the hose to warm up, then disconnect from the bulk storage tank with the wrench.
- **Transport of dewars through building**
 - When transporting a closed dewar within the building, no personal protective equipment is necessary.
 - Use a suitable, stable dolly or hand truck for transport. Do not attempt to carry dewars from one location to another.
- **Retrieving samples from liquid nitrogen storage**
 - Wear a face shield and loose fitting insulated gloves when retrieving samples. Rapid changes in temperature can cause a rupture in a sample container.
 - Remove lid of dewar, grasp the wire hook and maneuver the sample container to the centre of the opening.
 - Slowly lift the sample container straight up, then tilt slightly to allow excess liquid to run before lifting the item fully out of the dewar.
 - Gently set the sample container in a suitable location and retrieve the desired samples.
 - When returning the sample container to the dewar, ensure the wire hook is affixed securely, then lower slowly to into the dewar to minimize splashing.
 - Replace the lid.

Contingency Plans

- **Spills**
 - In the event of a spill, evacuate everyone from the area of the spill and keep the area unoccupied for 30 minutes. As the spilled nitrogen evaporates, it will displace oxygen, and it will take time for the ventilation system to return oxygen concentration to normal.
 - For spills larger than 4L, contact EHS. Clearance air testing may be required prior to reentering the area.
- **Hazardous Atmospheres**
 - Immediately stop what you are doing and leave the room if you begin to experience any symptoms of oxygen deficiency, such as:
 - Dizziness
 - Seeing spots
 - Rapid breathing
 - Poor coordination, giddiness or altered judgment
- **Skin or Eye Contact**
 - Skin – immediately flush area with warm (not hot) water. Remove any saturated clothing and if injury has occurred, dial x2000.
 - Eyes – immediately flush the eyes for 15 minutes, and dial x2000 to get help.

Applicable Policies & Regulations:

- University of Guelph Safety Policy 851.08.05