



### HAZARDS

Cryogenics are materials used to produce very low temperatures and are commonly used in laboratories. Cryogenic liquids have boiling points below  $-150^{\circ}\text{C}$  ( $-238^{\circ}\text{F}$ ), including liquid nitrogen which has a boiling point of  $-196^{\circ}\text{C}$  ( $-321^{\circ}\text{F}$ ). Liquid nitrogen (LN<sub>2</sub>) is inert, colourless, odourless, non-corrosive, non-flammable, tasteless, extremely cold, and has a volume of expansion from liquid to gas at a factor of almost 700.

The hazards associated with handling liquid nitrogen include: cold burns and frostbite due to personnel exposure; explosion due to over pressurization of liquid into large volumes of gas in inadequately vented equipment; asphyxiation due to displacement of oxygen in confined work areas; and fire or explosion due to condensation of atmospheric oxygen.

**Note:** you cannot detect an oxygen deficient atmosphere. Some dispensing locations may be equipped with a low oxygen sensor, however always ensure you are working in a well-ventilated space particularly when filling dewars.

Please observe the following safety information when handling LN<sub>2</sub>, familiarize yourself with the Material Safety Data Sheet and contact your supervisor for instruction prior to dispensing or handling.

### PERSONAL PROTECTIVE EQUIPMENT

The following safety equipment is required when working with or dispensing LN<sub>2</sub>:

- face shield and safety glasses
- loose fitting insulated cryogenic gloves
- long-sleeved shirt or lab coat
- pants without cuffs
- closed-toed shoes

### STORAGE

- Store liquid nitrogen only in approved containers that are specifically designed to withstand the low temperatures and allow for venting, such as a dewar or cryogenic liquid cylinder.
- Store containers in cool, dry, well-ventilated areas, away from incompatible materials and ignition sources, and in an upright position.
- Ensure liquid dewar flasks are non-pressurized, vacuum-jacketed vessels with loose fitting caps.
- Liquid cylinders are pressurized containers designed for dispensing cryogenic liquids. Ensure pressure relief valves in liquid cylinders are working properly; never plug, remove or tamper with the pressure relief valve.

## **DISPENSING**

Before dispensing liquid nitrogen ensure you have the appropriate personal protective equipment, correct fittings and hose, receiving dewar, and ensure you are in a well-ventilated area. Place the transfer hose into your receiving dewar, stand back and slowly open the liquid valve. Proceed slowly to avoid splashing. Do not fill the container more than 80% of capacity. Close the liquid valve when finished and never leave a filling process unattended.

Always use an intermediate-sized dewar (at least 5 litres) when dispensing directly from the cryogenic liquid cylinder. Small, bench-top containers should only be filled from an intermediate dewar and never directly from the cylinder to avoid splashing.

## **TRANSPORT**

Liquid nitrogen must be stored, handled and transported in an upright position. Do not roll, drag or drop containers. Use an appropriate cart to transport dewars and larger containers. Dewars should be covered with a loose fitting cap to prevent air and moisture from entering and allow for pressure release. If you need to move a dewar between floors do not travel with it in the elevator or allow anyone else to be present in the elevator. Instead use a buddy system, signage, elevator lock-out key, or other appropriate means to transport and receive the dewar from an elevator.

## **MEDICAL EMERGENCY**

- If skin comes in contact with liquid nitrogen flush the affected part of the body under warm water; never use dry heat and do not rub the frozen body part. Remove any clothing that is not frozen to the skin and proceed with flushing the skin with warm water.
- If the person becomes dizzy or disoriented while working with liquid nitrogen, move to fresh air immediately.
- Call 911 and Campus Security at 721-7599 to seek medical assistance.

## **SPILL RESPONSE**

A small amount of venting is normal and ensures the cylinder is relieving pressure build-up. However, if the venting seems abnormal or there is a large volume of gas released that cannot be controlled:

- Call Campus Security at 721-7599
- In case of serious injuries or fire also call 911
- If safe to do, secure the area to prevent others from entering
- Evacuate the area
- Remain near the scene in a safe location
- Identify yourself to the Campus Security Patrol Officer upon arrival