

Liquid Nitrogen Safety

Liquid nitrogen is one of the cryogenic liquids commonly used in research labs. It poses a risk of cold burns, explosion if stored in unvented containers and asphyxiation if not used in well-ventilated areas. Special care must be taken by personnel who handle or work in areas where liquid nitrogen is used.

Hazards

- **Extreme Cold:** The vapor of liquid nitrogen can rapidly freeze skin tissue and eye fluid, resulting in cold burns, frostbite, and permanent eye damage even by brief exposure.
- **Asphyxiation:** Liquid nitrogen expands 695 times in volume when it vaporizes. Thus, if sufficient liquid nitrogen is vaporized without proper ventilation, there is a risk of oxygen deficiency which may cause unconsciousness.
- **Pressure Buildup and Explosions:** Without adequate venting/pressure-relief devices on containers containing liquid nitrogen, pressure can build-up and lead to explosion.

Handling

- Liquid nitrogen should be stored and handled in well-ventilated areas.
- Handle the liquid slowly to minimize boiling and splashing. Use tongs to withdraw objects immersed in a cryogenic liquid.
- Do not transport liquid nitrogen in wide-mouthed glass Dewars or Dewars not protected with safety tape.
- Use only approved containers. Impact resistant containers that can withstand the extremely low temperatures should be used. Materials such as carbon steel, plastic and rubber become brittle at these temperatures.
- Only store liquid nitrogen in containers with loose fitting lids (Never seal liquid nitrogen in a container).
- Never touch non-insulated vessels containing cryogenic fluids. Flesh will stick to extremely cold materials. Even non-metallic materials are dangerous to touch at low temperatures.
- Never tamper or modify safety devices such as cylinder valves or regulators on a tank.
- Do not store liquid nitrogen for long periods in an uncovered container.
- Cylinders and Dewars should not be filled to more than 80% of capacity, since expansion of gases during warming may cause excessive pressure buildup.

Personal Protective Equipment (PPE)

- **Eye/face protection:** A full face shield over safety glasses or chemical splash goggle are recommended during handling.
- **Skin protection:** Loose-fitting thermal insulated or leather gloves, long sleeve shirts, and trousers without cuffs should be worn during handling.