



## CRYOGENS: SAFE HANDLING

Examples: Liquid oxygen, liquid nitrogen, liquid helium, dry ice

### Hazard Properties

- These materials are extremely cold (-100°C to -270°C) and, upon contact, can instantly freeze other materials. Serious tissue damage may occur upon exposure.
- Evaporating liquid nitrogen will displace the air within a non-ventilated space possibly leading to **suffocation**. Generally, labs have adequate ventilation to prevent this.
- Be aware of **ice that can plug or disable pressure-relief devices**. Ensure adequate pressure relief mechanisms are functional, i.e., never use tight-fitting stoppers or closures without pressure-relief devices.

### Practices

- Do not move an **over-pressurized container**. Evacuate and seal area, call EH&S or dial 911.
- Avoid trapping cryogenic liquids between closed sections of an apparatus.
- **Dewar flasks** or other glassware devices should be taped on the outside or provided with shatterproof protection to minimize flying glass particles in case of implosion. Dewar flasks should be vented with a bored or notched stopper.
- Cool cryogenic containers slowly to reduce thermal shock and flashing of the material.
- Cryogen handlers should be protected by a **face shield or safety goggles, lab coat or apron and gloves or mitts**.
- When utilizing cold baths with solvents, use in a hood with a catch pan. Be aware of increased fire hazard. Be prepared for **vigorous solvent boiling** upon initial addition of solvent. Avoid **condensing oxygen** (blue in color) and/or contact with organic material when using liquid nitrogen. Flush cold traps with nitrogen or keep under vacuum to avoid condensation of oxygen from air within the trap. Condensed oxygen when contacted with organic materials can cause a powerful explosion.
- **Liquid helium** requires EHS approved handling techniques and equipment due to over-pressurization hazards and icing.

### Freezing and Thawing Specimens

Cryogenic ampoules can be very dangerous if they have not been properly sealed, exploding violently after removal from liquid nitrogen storage. Cells and virus stocks should be stored in sealed ampoules and not in screw cap glass vials. Screw cap glass vials are permeable to liquid nitrogen (approximately 50% of the time) and therefore represent a source of contamination in the storage tank. Plastic screw cap ampoules also leak and must be used with a heat sealed sleeve. Upon thawing, sealed glass vials may explode, producing an aerosol of glass and cell debris. If freezing manually, place ampoules in the bottom of a beaker, cover with methanol and a dye, e.g., methylene blue, and transfer the entire beaker from refrigerator to freezer. The methanol provides even freezing and the dye will penetrate imperfectly sealed vials permitting their identification and elimination. When thawing cells, a lab coat, face guard and gloves must be worn. Ampoules to be thawed should be dropped into a plastic beaker containing 70% ethanol at 37°C within a spongy bucket and covered immediately. The volatility of many of the solvents used requires the use of a ventilated enclosure for vapor capture.

*For further information, contact the EH&S at 814-865-6391*