



Title: HANDLING CRYOGENIC CHEMICALS

Principle:

Special safety precautions are required when handling cryogenic chemicals, i.e., chemicals at a temperature lower than -73.3°C (-100°F). The safety procedures outlined below are for liquid nitrogen & Dry Ice, the only cryogenic used in the clinical laboratory.

Procedure:

A. Handling the Liquids

1. Avoid Contact

- a. Always handle the liquids & solids carefully and slowly.
- b. Stand clear of boiling and splashing liquid and its issuing gas.
- c. do not touch un-insulated pipes or vessels containing liquefied atmospheric gases with any unprotected part of your body.
- d. Use tongs to withdraw objects immersed in liquid.
- e. Use tongs and special protective gloves to handle Dry Ice.

2. Wear Protective Clothing

- a. Wear a **face shield** or **safety goggles** with slide shields.
- b. Wear asbestos or leather **gloves** when handling anything that is, or may have been, in contact with Cryogenics. The gloves should fit loosely so that they can be thrown off quickly if liquid should spill or splash into them.
- c. Wear a **lab coat** and **lab apron**.
- d. Wear **long pants**, preferably without cuffs.
- e. Wear shoes with closed toes and heels.
- f. Do not wear watches, rings, bracelets or other jewelry when working with cryogenics.¹

3. Ventilate Lab Properly

- a. Handle gas only in well ventilated areas. If you have any doubt about the amount of oxygen in a room, ventilate the room completely before entering it.
- b. Never dispose of cryogenics in confined areas or places where others may enter.
- c. If liquid nitrogen leaks from container or is spilled, evacuate all personnel from danger area. If without risk, shut off leak. Ventilate area or leak or move leaking containing to well-ventilated area. Test area for sufficient oxygen prior to permitting re-entry of personnel.³

4. Do Not Expose Liquid Nitrogen to the Air

Since liquid nitrogen is colder than liquid oxygen, oxygen contamination of liquid nitrogen will result in appreciable quantities of liquid oxygen. Liquid oxygen supports combustion.

Note: If the liquid nitrogen container is entirely closed expect for a small neck area, the nitrogen gas issuing from the surface keeps air away from the liquids and prevents oxygen contamination.

B. Selecting and Using Equipment for Handling Solids and Liquefied Atmospheric Gases

1. Use Proper Containers

- a. For all cryogenics use only containers specifically designed for holding each type. Containers should be constructed to withstand weights and pressures that will be encountered.
- b. For all cryogenics use only containers which are protected by a vent or safety device which permits the escape of vapors and relieves pressure.
- c. Containers should be equipped with rupture discs on both inner and outer vessels to release pressure if the safety relief valves should fail.

2. Fill Containers with Designated Cryogenic (Solid or Liquid)

- a. Fill containers only with the cryogenic they are designed to hold.
- b. Do not mix liquids.

3. Use Proper Transfer Equipment

- a. Use a phase separator or special filling funnel whenever you transfer liquid into a small container.

- b. For large containers, use a discharge tube or a transfer hose and pump to remove liquid. Hoses are available from vendors of cryogenic equipment.
- c. For Dry Ice use Tongs and Gloves to transfer.

C. First Aid for Cold-Liquid Burns

1. Contact on Skin

If any of the liquefied atmospheric gases contact the skin, immediately flood that area of the body with large quantities of unheated or warm water and then apply cold compresses. If the skin is blistered or there is any chance that the eyes have been affected, take the patient immediately to a physician for treatment.

Note: Prolonged contact with these temperatures will cause exposed body parts, e.g., the eyes, to become brittle.

2. Contact by Breathing

If a person seems to become groggy or loses consciousness while working with Liquid Nitrogen or Dry Ice, get him to a well-ventilated area immediately. Whenever a person loses consciousness, summon a physician immediately.

Note: If enough Nitrogen or Dry Ice gas evaporates from the liquid in an unventilated space, the percent of oxygen in the air may be dangerously low. If this occurs, a person can become unconscious without sensing any warning symptoms, such as dizziness.

Written by: Gail Zander, CT (ASCP), 8/23/2010

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Approval of Procedure:

Medical Director Signature: *M. Scott Zander, M.D.*

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