

Please report all accidents and near misses. Things happen and it is important to learn from others. Environmental Health and Safety and your colleagues appreciate hearing about incidents, reviewing their causes and learning from them.

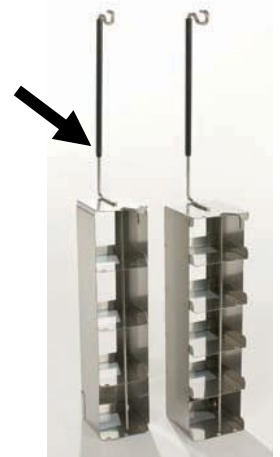
STORING SAMPLES IN A LIQUID NITROGEN DEWAR

Cryogenics are substances used to produce very low temperatures of below -153 degrees Celsius. Liquid nitrogen, which has a boiling point of -196 degrees Celsius (-320 Fahrenheit), is a liquid that is commonly used in laboratories. All cryogenics can be extremely hazardous if not handled properly. Direct contact with the liquid, vapor or non-insulated parts of equipment used to transfer cryogenics can immediately freeze body tissue and cause frostbite and injuries similar to a thermal burn. Cryogenic liquids also rapidly expand when converted from a liquid to a gas as it warms, leading to the possibility that enough oxygen is displaced for asphyxiation to occur.



What Happened?

In February 2016, a Yale researcher was attempting to store biological samples in a free standing, 10-liter liquid nitrogen dewar. The researcher did not properly secure the bar on the rack which holds the samples in place when the rack is lowered into the liquid nitrogen. Because of this, the tubes were not secure and fell to the bottom of the liquid nitrogen dewar when the rack was being immersed in the liquid nitrogen. The researcher was also not wearing the proper personal protective equipment and was working in the lab alone after hours.



What Went Right?

- The researcher did not attempt to reach into the dewar to retrieve the biological samples.
- The researcher contacted Environmental Health and Safety to report the incident.
- Their liquid nitrogen supplier was contacted to assist in removing the samples.

What Should Have Been Done Differently?

The samples should have been properly secured to the holder prior to lowering the rack into the dewar. The researcher should have been wearing the proper personal protective equipment for working with liquid nitrogen. This includes gloves rated for working with cryogenic materials, safety glasses, a face shield for larger volumes, long pants without cuffs and solid top shoes.

What Corrective Actions Have Been Taken?

The samples were eventually recovered using a long-handled tool. Lab personnel were retrained on how to handle liquid nitrogen, properly store samples in a dewar and on the importance of safety procedures.

How Can Incidents Like This Be Prevented?

- Be sure all materials are properly secured prior to storing in liquid nitrogen.
- Wear the proper personal protective equipment including gloves rated for working with cryogenic materials, safety glasses, a face shield for larger volumes, long pants without cuffs and solid top shoes. Winter gloves are not a substitute for cryogen gloves.
- Do not use or directly store cryogenics in a confined area, cold room, or any type of room which does not have active exhaust ventilation. The off-gassing cryogenics could quickly cause an oxygen-deficient atmosphere.

More Information

- **Occupational Safety & Health Administration:** Laboratory Safety: Cryogens and Dry Ice (<http://1.usa.gov/1TYg9lK>)
- **Yale University:** Cryogen Use and Storage Guidelines (<https://bit.ly/2IpMznV>)
- **Yale Environmental Health and Safety:** Lessons Learned: Over-Pressurization of Cryovial (<http://bit.ly/1UcnIHm>)
- **Yale Environmental Health and Safety:** Alert: Hazards Associated with Immersion of Cryovials in Liquid Nitrogen (<http://bit.ly/1T7BE4b>)
- **Contact your Safety Advisor** at 203-785-3550 if you have any further questions.