

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.

LIQUID NITROGEN DEWAR VALVE FAILURE

Liquid nitrogen is a cryogen that is commonly used in laboratories. Like all cryogenic liquids, it can be extremely hazardous if not handled properly. Cryogens rapidly expand when converted from a liquid to a gas as they warm. Due to this rapid expansion, if an uncontrolled release of liquid nitrogen were to occur, even in a well-ventilated space, it is possible that enough oxygen would be displaced for asphyxiation to occur. As a note, levels ≤ 19.5 percent are considered oxygen deficient.

What Happened?

In February 2018, a Yale researcher contacted EHS because they were unable to close the valve on one of the liquid nitrogen dewars in the laboratory. The personal oxygen monitor in the lab indicated that oxygen levels were lower than normal. Upon arrival, EHS found that the researcher was able to shut the valve, however the oxygen levels at the entryway to the laboratory were 18 percent, indicating an oxygen deficient atmosphere. With the dewar valve closed, the oxygen levels quickly rose back to normal.



What Went Right?

- The dewar was placed next to the fume hood to help quickly exhaust the gas from the laboratory.
- The laboratory had a personal oxygen monitor because of the large amount of cryogen in the room.
- The researcher contacted EHS for assistance when they noticed that the oxygen levels were low.

What Should Have Been Done Differently?

- There was a note in the laboratory indicating that the valve was not working properly. The laboratory should have contacted their supplier for a replacement tank immediately upon noticing a problem.
- Immediate evacuation from the laboratory should have taken place since oxygen levels were below 19.5 percent. Oxygen monitors are set to alarm at this level.

What Corrective Actions Have Been Taken?

- The supplier was contacted. They removed the tank with the faulty valve and replaced it with a new one.
- The research group was reminded of the proper procedures to take if this type of valve failure occurred again, including immediate replacement of the dewar and evacuation of the laboratory when the oxygen monitor alarms.

How Can Incidents Like This Be Prevented?

- Ensure all valves are working properly.
- Report problems immediately to the lab manager or PI.
- Contact the supplier as soon as an issue is noted to prevent catastrophic failures.
- In laboratories where large amounts of cryogen are used/stored, a personal or fixed oxygen monitor may be necessary. Contact your Safety Advisor for an evaluation.

More Information

- **Occupational Safety & Health Administration:** Laboratory Safety: Cryogenics and Dry Ice (<http://1.usa.gov/1TYg9lK>)
- **Yale University:** Cryogen Use and Storage Guidelines (<https://bit.ly/2IpMznV>)
- **Contact your Safety Advisor** at 203-785-3550 if you have any further questions.