

The University of Texas at Austin Laboratory Refrigerator/Freezer Safety Procedures

Overview

Lab refrigerators are used to store volatile, noxious and air sensitive materials and it is not uncommon for the atmosphere inside the unit to be saturated with chemical vapors. Over time, these vapors can penetrate porous surfaces and lead to odor problems. Similarly, material from spills or leaking containers can impregnate surfaces that then give off odors long after the original material is cleaned up.

In addition to problems associated with odor, accumulated vapors arising from chemicals stored in refrigerators present a flammable or explosive hazard due to the in-built ignition sources in the refrigerators. Loss of electrical power can produce extremely hazardous situations. Flammable or toxic vapors may be released from refrigerators and freezers as chemicals warm up and/or certain reactive materials may decompose energetically upon warming.

Examples of ignition sources within household refrigerators include:

- Switches associated with the internal light and thermostat;
- Timers and heating elements in frost free refrigerators;
- The compressor motor, if the cabinet is not effectively sealed and vented from water in the drain tube of frost free refrigerators or chemicals present in the refrigerator;

Types of Refrigerators/Freezers

There are primarily three different types of refrigerators/freezers for chemicals:

- *Household (Domestic)*: Although not recommended for laboratory use, household refrigerators and freezers may be used for storage of aqueous solutions. Liquid and solid chemicals should not be stored in these refrigerators.
- *Lab-Safe (or Explosion-Safe or Flammable)*: Refrigerators and freezers are used for storage of flammable or explosive materials. This type of cooling technology has no internal switching devices that can arc or spark as a source of ignition. The compressor and other circuits usually are located at the top of the unit to reduce the potential for ignition of flammable vapors. These refrigerators also incorporate features such as thresholds, self-closing doors, and magnetic door gaskets. Special inner shell materials limit damage should an exothermic reaction occur within the storage compartment.
- *Explosion-Proof*: Refrigerators are designed to be operational in areas where the air outside the refrigerator might be explosive. This includes liquids, gases, or solids with flashpoints of less than 100°F. Explosion-proof refrigerators feature enclosed motors to eliminate sparking and bear a FM[®] (Factory Mutual) or UL[®] (Underwriters Laboratory) explosion-proof label. Such refrigerators must meet the requirements for Class 1, Division 1 Electrical Safety Code (NPFA 45 and 70) and require direct wiring to the power source via a metal conduit.
 - In a typical lab setting explosion-proof refrigerators are usually not necessary.

Storage requirements also apply to any solution or specimen that may release flammable

vapor. For example, lab animals euthanized with ether animals have been known to cause explosions in refrigerators.

Refrigerators used to store flammable materials must be approved for storing those types of materials by Factory Mutual or Underwriters Laboratory. The refrigerator and freezer must be appropriately labeled by the manufacturer.

Signage

Prudent Practices in the Laboratory notes that the storage of food and beverages in refrigerators containing chemicals violate good laboratory practice. This results from the potential for contamination of food and subsequent ingestion. There also are fire and explosion factors. Flammables can never be stored in household refrigerators or freezers. Therefore, refrigerator/freezers must have appropriate signage. Examples of such signage available from Environmental Health and Safety (EHS):

Do Not Store Flammable Solvents in This Refrigerator

Do Not Store Food Or Drink in This Refrigerator

Safe Laboratory Refrigerator/Freezer Operating Procedures

The Principal Investigator or his/her designee has the primary responsibility of oversight of the refrigerated units in their lab. Although not necessarily exhaustive, the following is a list of common laboratory refrigerator/freezer operational safety considerations:

- **Never** store food or drink in any refrigerator or freezer used in a laboratory.
- Ensure that the chemicals stored in the refrigerator are compatible
- All containers placed in a refrigerator/ freezer should be *completely sealed or capped and safely positioned/securely placed*. Containers should not be capped with aluminum foil, corks, and ungreased glass stoppers. Containers with screw-top lids should be secured with parafilm or placed in plastic bags. Vessels sealed with properly greased and secured ground glass joints are acceptable, but these should also be secured with parafilm or placed in plastic bag
- Chemicals should be allowed to warm to room temperature before sealing to prevent pressure buildup.
- Shelves in refrigerators should all have suitable plastic trays for secondary containment in the refrigerator and freezer compartments. If plastic trays are not available, liquid chemicals should be placed in secondary containers to contain the spill.
- All items stored in a refrigerator must be appropriately *dated* and *labeled*. Secondary

containers should be initialed by the owner.

- Store only chemicals in amounts needed over a reasonable amount of time. Each chemical has a *shelf life and may form decomposition products* that can be hazardous. Compounds stored in refrigerators may be especially prone to degradation if not properly stored and sealed.
- Remember that *power outages* and technology failures can cause internal temperatures to rise, which can impact chemical contents. Be aware of unusual odors, vapors, etc, when opening the refrigerator.
- An *inventory* must be posted on the refrigerator door.
- Units must be grounded and permanently installed; *extension cord may not be used*.
- Chemical refrigerator/freezers should be located away from laboratory exits. If this is not possible because of laboratory configuration, then at least one exit must not have a refrigerator within six feet.
- Refrigerators and freezers should be *cleaned-out and manually defrosted* at least annually or more frequently as needed. EHS will inspect units annually.

Spill Contingency and Decontamination

The following procedures should be utilized in the event of a broken container, leak, or spill:

- *In the Event of a Spill*—Contact the University EHS at (512) 471-3511 for non-emergencies that are not immediately dangerous to human health and the environment. Otherwise and always during non-business hours, contact the University Police Department (UTPD) by dialing 911. UTPD will contact the Austin Fire Department or the EHS oncall team as appropriate.
- *For Non-Hazardous Items*—Refrigerators/freezers not used for the storage of chemicals, biological agents, or radioactive materials can be emptied and defrosted by the users. Any spillage or leakage of non-hazardous material can be cleaned with soap and water.
- *For Chemicals Only*—Remove all items and defrost. If chemicals have spilled or leaked, clean with the appropriate solvent, e.g., isopropyl alcohol or soap and water. Note that stronger solvents may damage the plastic parts of the fridge. Follow directions from the material safety data sheet (MSDS) for each chemical and dispose of waste properly through EHS.
- *For Biological Agents Only*—Remove all items and defrost. If biological agents have spilled or leaked, clean with a 10% bleach solution. Dispose of waste properly either through autoclaving or EHS.

- *For Combinations of Chemicals and Biological Agents*—Remove all items and defrost. If any chemicals and/or biological agents have spilled or leaked, follow the aforementioned protocols. Be careful not to combine incompatible substances such as bleach and ammonia. Dispose of waste properly.
- *For Radioactive Material and Any Combination of Radioactive Material with Chemicals, or Biological Agents*—Contact EHS Radiation Safety Section at (512) 471-3511 immediately.

Long-Term Cooling and Freezing of Laboratory Materials

Researchers should consider the need for and the effects of long-term cooling and freezing of hazardous chemicals. MSDSs are a source of information determining the need for cooling or freezing chemicals. Other important information includes hazardous decomposition products produced over time. Additional information can be secured from manufacturers.

Questions

For laboratory refrigerator/freezer health and safety concerns or questions, contact EHS at (512) 471-3511.