OCCUPATIONAL AND ENVIRONMENTAL HEALTH AND SAFETY
THE UNIVERSITY OF UTAH

LAB SAFETY BULLETIN

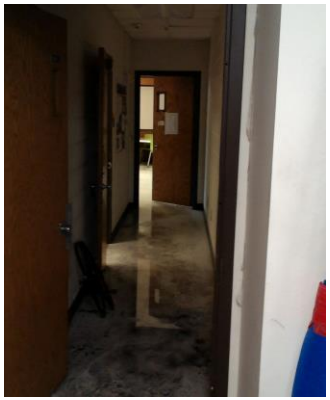
Description of Incident

On February 11, 2017 a fire occurred in a laboratory in the South Biology Building on campus. The cause of the fire was determined to be storage of a flammable material (isopentane) in a refrigerator that was not rated for storage of flammable materials. I was further discovered that the refrigerator was used for storage of food.

The fire was extinguished when the fire sprinkler system for the building activated but there was significant damage to the lab.

Lessons Learned

- Flammable chemicals must only be stored in a refrigerator that is rated for the storage of flammable liquids
- Laboratory refrigerators are not for the storage of food and should be labeled accordingly
- A seemingly small incident has a large impact on a lab and on surrounding areas – there was significant flooding from the fire sprinklers



Bottom Line

It is unsafe to store flammable liquids in domestic refrigerators or freezers. Explosions, injuries, and costly laboratory fires have resulted from this dangerous practice. There are two types of refrigerators used in campus laboratories to prevent the ignition of flammable vapors:

- "laboratory-safe" or "flammable material"
- "explosion-proof"

Flammable material refrigerators and freezers are designed to prevent ignition of flammable vapors inside the storage compartment and should be purchased whenever a refrigerator is needed to store flammable liquid. A flammable liquid is defined by the fire code as having a flash point of less than 100 °F (38°C). Some examples of common flammable liquids are listed at the end of this bulletin.

All the electrical components in this type of refrigerator are outside the refrigerator, and the compressor is sealed or located at the top of the unit. Flammable material refrigerators also may incorporate design features such as thresholds, self-closing doors, magnetic door gaskets, and special inner shell materials that control or limit the damage should a reaction occur within the storage compartment. A label stating "Flammable Materials Refrigerator: Keep fire away" can identify such refrigerators. The refrigerators must be U.L. Listed as Flammable Material Storage Refrigerators. Ultra low freezers (less than -40°F) generally cannot be approved for storage of flammable materials.

Explosion-proof refrigerators are designed to prevent ignition of flammable vapors or gases that may be present outside the refrigerator. This type of refrigerator must be used in locations such as solvent dispensing rooms, where a flammable atmosphere may develop at some time in the room. Explosion-proof refrigerators have very limited use on campus and require special hazardous-location wiring rather than simple cord-and-plug connections. Please contact OEHS at 801-581-6590 if you believe you have a need for an "explosion-proof" refrigerator.

If you are unsure what type of refrigerator you have in your laboratory or what type you should purchase, contact OEHS at 801-581-6590. Regardless of type, every laboratory refrigerator and freezer must be clearly labeled to indicate whether it is appropriate for the storage of flammable materials. If your laboratory refrigerator is unlabeled, it is probably not rated for flammable storage and should not be used for that purpose

Laboratory refrigerators should also be labeled "No Food" Food should never be stored or consumed near chemicals. For more information on using refrigerators and freezers for storing hazardous materials, contact OEHS at 801-581-6590.

Common Laboratory Solvents

Do not store these liquids in non-rated refrigerators.

Chemical	Flash point (°F)	Chemical	Flash point (°F)
Acetone	4	Isopropanol	53
Acetonitrile	42	Methanol	54
Benzene	12.2	Petroleum Ether	20
Butanol	84	Propyl Alcohol	74
Cyclohexene	10	Pyridine	68
Dioxane	54	Tetrahydrofuran	6
Ethyl Acetate	24	Tetramethyl-ethylenediamine	50
Ethyl Alcohol	55	Toluene	40
Ethyl Ether	-49	Triethylamine	20
Hexane	-7	Xylene	84