

LESSONS TO BE LEARNED

Generated from Actual Incidents by EHSO

Issue No. 29

September 30, 2009

Type of Incident: **Laboratory Refrigerator Explosion**

What Happened: Many small tubes of petroleum ether were stored in a laboratory refrigerator/freezer. Petroleum ether, a very flammable liquid, has a flash point as low as -56° F, and is classified as a Class 1A flammable with an NFPA 704 fire hazard rating of 4. Apparently the tubes were not sealed well, and over time, the petroleum ether evaporated in sufficient quantity that the concentration exceeded the lower explosive limit, about 1.0%. The refrigerator and a nearby liquid scintillation counter were destroyed and other equipment and room damage occurred when the pet. ether exploded.

Immediate Cause: Improperly sealed volatile chemical resulted in vapor detonating when a spark from an internal component of the refrigerator (e.g., thermostat, light switch) cycled on or off. Removing electrical fixtures from inside the refrigerator cabinet does not qualify a refrigerator for flammable storage.

Root Causes: 1. Storing flammable liquids in a domestic refrigerator not constructed or rated for these materials.
2. Failure to properly seal and periodically inspect chemical containers in storage.
3. No beaker of activated charcoal inside refrigerator to adsorb escaped vapors.

Corrective Actions: 1. Use flammable storage refrigerators which are UL approved for storage of flammable chemicals. Flammable storage refrigerators have no electrical sparking devices, relays, switches, or thermostats that could ignite flammable vapors inside the cabinet. Flammable storage refrigerators also 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.
2. Chemicals not in immediate use must be properly closed and stored.
3. When you smell vapors, even in approved flammable storage refrigerators, place a beaker of activated charcoal to adsorb the vapors. When these are saturated, replace with fresh carbon and dispose of contaminated carbon in a sealed container through the UIC EHSO Hazardous Waste Program.



Refer to the UIC Chemical Hygiene Plan Manual Pg. 19 at <http://www.uic.edu/depts/envh>