UCI Environmental Health & Safety

Lessons Learned
Chemical Spill
July 18, 2023

What Happened?

On July 18, 2023, EHS responded to a call about an odor coming from a room on the third floor of a campus building. A very pungent odor was present and EHS closed off the area from further entry. A third-party vendor was called to clean up the spill and they identified a cardboard box containing a shattered bottle of ethyl orthoformate. The Safety Data Sheet (SDS) for this chemical indicates that it is flammable, moisture sensitive, and the vapors may form explosive mixtures with air. In addition to the broken ethyl orthoformate bottle, the third-party vendor found a tray with several open chemical containers sitting in a pool of an unidentified liquid. The vendor removed everything broken or contaminated and cleaned the affected areas in the lab. Existing laboratory ventilation, augmented by a portable fan unit, was relied upon to clear the residual odor in the lab. The room in which these chemical containers were stored also contains equipment (i.e., freezers) that generate a high heat load, and the room's temperature could reach as high as 90° F. With the flash point for ethyl orthoformate at 35° C (95° F), this chemical needs to be kept in a cool and ventilated storage space.

The room is used as a shared space for the department and chemicals were moved there when another lab was cleaned out.

Incident Causes:
The **Root Cause** of the incident is the lack of oversight of the room's chemical storage area resulting in improper storage conditions. Flammable chemicals need to be stored in a flammable storage cabinet and chemicals of different non-compatible hazard classes need to be properly segregated. The elevated temperature in the storage room caused by the heat output from freezers and other equipment, disqualifies the room to be used as a proper chemical storage room for flammable chemicals.

Direct Cause:
The elevated temperature in the room caused the triethyl orthoformate to vaporize in the container, building up pressure, and causing the container to shatter.

What can be done to prevent this from occurring again?

- Old chemicals past their expiration date should be disposed.
- Properly store and segregate chemicals and ensure personnel are aware of how chemicals should be stored.
- Chemical containers should be properly labeled and closed.
- Chemical inventories should be updated regularly for each lab.
- Assign a responsible party to periodically inspect the chemical containers in the room to ensure there is no overcrowding on the shelf and the room's temperature is kept cool.
- Move freezers and other equipment with a high heat load to alternate locations to maintain a cool environment for the chemicals if necessary.

Where to Get Help or More Information:
For more information or questions, or to receive assistance, please contact EHS at (949) 824-6200 or at safety@uci.edu