

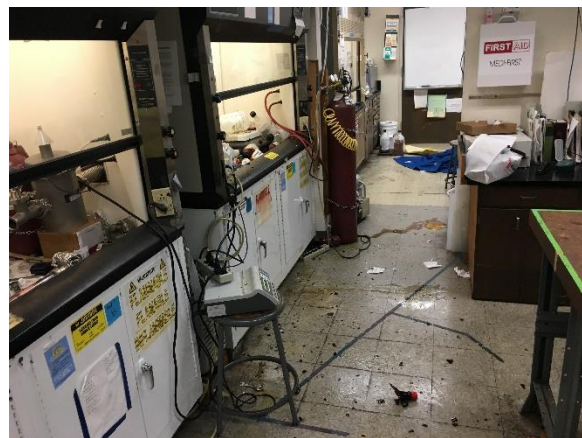
Lessons Learned

Nitric Acid Waste Over-pressurization Event

What happened?

A graduate student researcher was consolidating aqueous nitric acid solutions into a 4-L bottle marked as hazardous waste. The bottle was stored inside a fume hood along with other waste bottles, organic reagent bottles, a hotplate and an oil bath. The fume hood sash was left open when all researchers left at the end of the day.

Several hours later, a custodian entered the lab and saw broken glass and brown liquid on the floor. It appears that the nitric acid waste was stored in a bottle that contained residual organic compounds, the combination of which generated sufficient pressure to shatter the holding vessel and the surrounding glassware.



What went right?

- The lab group kept an updated Chemical Hygiene Plan in the lab, which allowed emergency responders to find the contact information for the group's safety coordinator.

What should have been done differently?

- Vented caps or waste funnel systems with closeable lids should have been used for waste storage in order to prevent gaseous buildup.
- Pre-rinsed, empty organic reagent bottles should not have been utilized for collecting nitric acid waste.
- The number of stored chemicals in the fume hood should have been kept to a minimum to prevent the subsequent spill and glass breakage.
- The fume hood sash should have been closed at the end of the day to contain the glass shards from the broken vessel and surrounding glassware.

What was the cause of the over-pressurization event?

The waste container that the nitric acid was stored in had trace amounts of organic compounds. Nitric acid is a reagent encountered most frequently in over-pressurization incidents due to its effective oxidizing capacity. Nitric acid mixed with organic compounds, reducing agents and metals can yield violent, pressure-generating conditions. When it reacts, it yields gaseous carbon dioxide and nitrous fumes, the combination of which can shatter containers.

What corrective actions have been taken?

EH&S staff have provided the group with poly-coated bottles with vented caps and instructions on how to order more waste bottles through the Hazardous Waste Program (HWP). The fume hood has been recalibrated and sash is kept closed at the end of the day.

Lessons Learned

This incident emphasizes the importance of proper storage and use of appropriate containers to prevent the mixing of incompatible wastes. To prevent similar incidents, follow the guidelines below:

- Store acid wastes in the original container rather than in multiple acid waste bottles.
- Do not use empty organic reagent bottles to store acid waste solutions.
- Use vented caps or safety waste funnel systems to mitigate possible pressure buildup in containers.
- Keep the number of stored solvent/reagent bottles in the fume hood to a minimum to prevent subsequent spills and glass breakage.
- Pull fume hood sash down at the end of each workday, or when not in use, to contain any possible over-pressurization events.

More Information:

National Institute for Occupational Safety and Health: Nitric Acid International Chemical Safety Card (<http://1.usa.gov/1rUoEoh>)

For additional assistance, contact EH&S at ehs@berkeley.edu or (510) 642-3073, Lessons Learned date: 7.2018