

Please report all accidents and near misses. Things happen and it is important to learn from others. Environmental Health and Safety and your colleagues appreciate hearing about incidents, reviewing their causes and learning from them.

SAFE DISPOSAL OF WASTE CONTAINING NITRIC ACID

Recent incidents at Yale and institutions around the country that have resulted in injuries serve as a reminder of the hazards of working with nitric acid. Nitric acid is an extremely corrosive acid. It is also a strong oxidizer, **which reacts violently with many materials** including organic compounds (alcohols, acetone, acetic acid), reducing agents (metal hydrides, formic acid, phosphorus acid) and metals (lead, zinc, aluminum). There are several variables, which affect how violent the reaction may be, including the concentration of the nitric acid, the temperature and the additional chemicals involved. **The reaction time can vary from minutes to days, making the mixture seem compatible at first.** For these reasons, it is important to review and confirm chemical compatibility prior to mixing waste nitric acid with any other compounds.



What Happened?

- In October, 2014, a chemical waste can exploded and released a spray of chemicals within a 10-foot radius of the can in a Yale laboratory. The aluminum bottle propelled from the floor to the top of the fume hood cabinet and the bottom was ripped off. The waste can was labeled with ethylene glycol, but also contained hydrochloric acid and was mistakenly mixed with hydrogen peroxide or nitric acid, which led to the explosion due to over-pressurization.
- In October, 2014, three graduate students at the University of Rochester were injured during an explosion when they mixed sulfuric, hydrochloric and nitric acids in a waste container, which may have contained some residual organic solvent that was used to rinse the bottle prior to its being used for waste collection. After the acid waste was added, the cap was tightened, causing the bottle to over-pressurize and explode.
- In February, 2015, three undergraduate students and a graduate teaching assistant at Texas Tech University were injured when a glass waste bottle exploded. Several days prior to the explosion, a student added nitric acid wash into the glass waste bottle, which already contained methanol and dimethylglyoxime. The student then capped the bottle, leading pressure to build up inside as the materials reacted over the weekend. The bottle exploded as another student later tried opening it.

Nitric acid mixed with organic compounds, reducing agents and metals can cause an explosion.

How Can Incidents Like This Be Prevented?

To safely dispose of waste nitric acid:

- Never mix inorganic acids and organic solvents.
- Ensure that containers of nitric acid solutions are compatible with their contents, i.e., no metal, free of organic residue.
- Keep containers of nitric acid solutions capped at all times and use a vented cap, if necessary. Contact Environmental Health & Safety at 203-785-3550 for a free sample of these caps. Vented caps which fit 20L carboys are also available from Environmental Health and Safety at no charge.
- To request a pickup of nitric acid waste, submit a chemical waste pickup request in EHS Integrator at <https://ehsis.yale.edu/EHSIntegrator>.

More Information

- **National Institute for Occupational Safety and Health:** Nitric Acid International Chemical Safety Card (<http://1.usa.gov/1rUoEoh>)
- **Contact your Safety Advisor** at 203-785-3550 if you have any further questions.

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