



Rotatory Evaporator Accident - August 2017

What happened?

On August 16, 2017 at around 8pm a first year graduate student was using a rotatory evaporator (rotovap) to work up a published reaction in the synthesis of fluorescent indicators. The 500mL round bottom flask had acetic anhydride, acetyl chloride, and other highly corrosive byproducts from the reaction when it fell into the 50°C water bath.

The researcher reached in to try to catch the flask and reported that a couple seconds later there was a splash that got on their face and into their eye. The accident was witnessed by a colleague who immediately took the researcher to the eye wash and assisted with the flushing of the researcher's eye for 20 minutes while they waited for emergency medical assistance. The researcher was transported to the University of Chicago Emergency Room by ambulance and was later joined by colleagues. The researcher was discharged and followed up with an ophthalmologist; however no permanent damage is anticipated.

What was the cause?

The researcher was adjusting the angle of the rotovap when they accidentally hit the rotation speed knob causing the rotovap to also speed up. A Keck clamp was in use however the flask and clamp might not have been properly placed on the bump trap. The researcher was wearing a lab coat, nitrile glove, and personal prescription eyeglasses with no safety glasses/goggles over them at the time of the incident. The fume hood horizontal sashes were completely pushed aside compromising containment.

The researcher called for help when the liquid splashed on their face and eyes, however their colleague had to direct them all the way around the bench to the nearest eyewash even though there was one about 5 feet away, because the direct route was obstructed by chemical waste and a curtain.

While the researcher was flushing their eyes other lab members tried calling the Office of Research Safety main line before calling University of Chicago Police Dispatch (**123, 773-702-8181**). A lab member met UCPD and Chicago Fire Department in the lobby to direct them to the laboratory. The Principal Investigator was notified the next morning.

What were some of the things done well?

While an accident did occur no permanent injury is expected. A number of things were done correctly that prevented a worse outcome. Please review your lab's work practices to see what you can be doing better.

- The researcher was not working alone even at 8pm.
- Work was being done inside a fume hood.
- A Keck clamp, which was in good condition, was being used to attempt to secure the flask in addition to the negative pressure of the vacuum
- The lab responded calmly and efficiently which likely prevented any permanent and significant injury.

- The researchers were current with Fire Safety and Chemical Hygiene Plan trainings.
- A lab member went to meet the first responders in a common area.
- The lab members went to the emergency room with their colleague.

What are some lessons learned from the incident?

Rotatory evaporation is a very efficient way to work up reactions by removing volatile chemicals under increased temperatures and decreased pressure. There are many moving parts as the rotovap rotates to increase the surface area of the solution. The different adjustments and components must be properly evaluated and adjusted every time the system is used. Some other lessons that can be learned from this incident include

- Highly corrosive and water reactive chemicals can be worked up on a high vacuum line in an silicon oil bath with a magnetic stirrer
- A rotovap should be completely adjusted and set up before starting the rotation.
- Ensure the Keck clamp is properly securing the flask.
- Researchers should work behind the horizontal sashes of a fume hood.
- Personal prescription glasses do not offer sufficient eye protection unless they are fitted with side shields and prescription safety lenses (see the Eyelation® kiosk in the GCIS store, W143, for more information).
- Splash goggles and/or a face shield should also be worn when there is an increase risk from splash hazards.
- Routes to emergency equipment should not be obstructed to allow for quick access.
- Labs should contact **123** first when responding to emergency situations.

References and Resources

1. University of Chicago's Chemical Hygiene Plan template
2. University of Chicago Emergency Contact Sheet
3. National Research Council. 2011. Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Version. Washington, DC: The National Academies Press. <https://doi.org/10.17226/12654>.