

LESSONS LEARNED MEMO

NITRIC ACID EXPOSURE IN A CHEMISTRY TEACHING LAB

A recent incident in a chemistry teaching lab resulted in a student's face being spattered with concentrated nitric acid. The emergency eyewash was used to wash off the acid. Then the student was taken to the hospital for further evaluation and treatment. The student received second degree burns in a few spots on the face that were a couple of millimeters in diameter. The student was wearing the proper safety equipment (gloves, goggles, and apron) at the time of the accident which protected the eyes from the concentrated nitric acid that landed right at the spot where the goggles meet the face. The purpose of this memo is to provide you with the details of the incident plus safe working practices that must be enforced in all chemistry labs if they are not already being practiced in this or similar situations.

What Happened?

The student, working in a fume hood, was using ~10 milliliter of concentrated nitric acid to dissolve a penny inside a beaker. A one-ml disposable plastic pipette was used for transferring the acid into a graduated cylinder. After the student finished using the pipette, it was blown out, turned upside down, and propped against another piece of glassware in the hood. When the student picked up the pipette to throw it away, the finger pressure on the barrel of the pipette caused it to squirt drops of acid which were trapped in the tip of the pipette upwards towards the face.

What Was Learned?

The incident could have been avoided if the student had not used a plastic pipette for handling concentrated corrosive liquid like nitric acid. Inverting the pipette attached with the bulb was another mistake that caused this exposure.

Clearly the use of Personal Protective Equipment like goggles (not safety glasses), proper gloves, and aprons worked and protected the eyes of the student from injury. The lesson here is that this practice must be continued without any exception by everyone, including the Teaching Assistants (TAs), while working with corrosive and hazardous chemicals in the teaching laboratories.

Students must be encouraged to keep the sash of the hood closed at all times and only opened to the bare minimum while handling the chemicals. The space inside the hood must be used only for working with hazardous, toxic, and volatile materials – not for storing larger volumes of these compounds and other glassware.

TAs should spend a couple of minutes at the beginning of every class where hazardous and toxic compounds are used, reviewing important safety equipment (fire extinguisher, safety shower, eyewash station, safety telephone and whom to call during an emergency, first aid kits), their location, and use. The hazardous nature of toxic and corrosive

compounds should be discussed briefly with the help of the MSDS if they are being used in the assigned experiments. The attending TA and Stockroom Personnel should verify that only proper glassware, pipettes, and other tools are given to the students to proceed with the experiment safely.

The presence and constant guidance by the attending TA is vital for the safety of the students, some who are fresh high school graduates, working in the undergraduate teaching labs with hazardous chemicals.

It is a good idea to consider scaling down the use of hazardous materials in the undergraduate teaching labs without compromising the learning experience and the outcome of the experimental results.

Recommended Actions:

1. Always use Personal Protective Equipment (PPE) like proper gloves, lab coat, and goggles when working with hazardous chemicals.
2. Always use proper size glassware and other tools necessary to conduct the experiment.
3. Always work with hazardous compounds in the hood with the sash opened barely to the minimum. Keep the sash closed while not using the hood.
4. Make a conscious effort not to overcrowd the hood with other glassware and supplies – keep it neat and clean with only those items needed in the assigned experiments.
5. Instructors and Stockroom personnel should provide hazardous compounds to students in smaller volume/amounts, especially if the compounds are extremely hazardous. Also, experiments using hazardous compounds should be reduced to micro scale where possible.
6. Details about safety equipment, emergency phones, and the hazardous nature of the compounds in use in the current experiment must be reviewed with the students before they start working.
7. Undergraduate students, while handling hazardous materials or operations in a teaching laboratory, should never be left alone. The attending TA must not only be present in the labs at all times but must pay attention to what the students are doing and arrange for providing immediate help after an incident.
8. Report any incident to your supervisor and proper UCI personnel (EH&S at 4-6200, UCI Police at 4-5222) promptly. When emergency help is needed – dial 911 from any UCI phone immediately.