Chemistry Safety Notes

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"Chemistry Safety Notes" is published by the Chemistry Dept. Safety Committee, written & edited by Debbie Decker, Safety Mgr.

Personal Protective Equipment

PROPER LABORATORY ATTIRE: Long pants (or equivalent to cover the legs) and proper shoes to cover the entire foot. Leggings or tights are not "pants" and are not allowed. Safety glasses. **EVERY TIME YOU'RE IN THE LABORATORY!**

BASIC PPE: Lab coat and safety glasses. Additional PPE will be listed in the lab-specific LHAT.

Three types of lab coats are common:

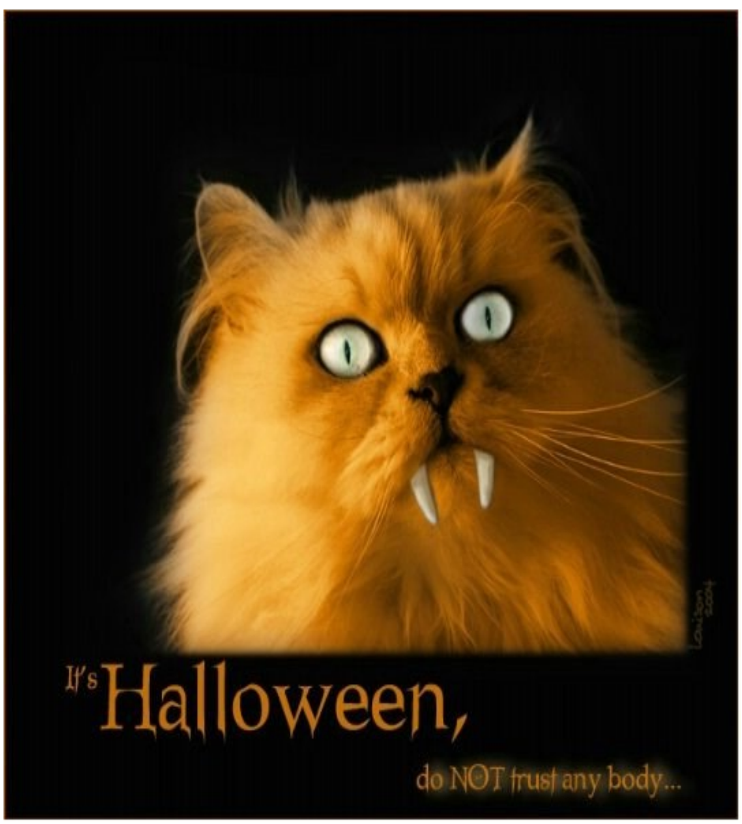
White cotton/polyester blend—suitable for basic lab work

Dark blue Nomex—suitable for work with pyrophorics, quantities of flammable liquids with an ignition source; not suitable for work with corrosives

Light blue cotton—For TAs in teaching labs; suitable for use of quantities of flammable liquids, corrosives

Barrier—suitable for work with biological agents. Not suitable for work with quantities of flammable liquids or around ignition sources.

And please send that manky lab coat for laundry!



ACS Program In A Box "Tales of Lab Safety: How to Avoid Rookie Accidents" Recap

About 40 folks from the Department and from the Sacramento Section of the ACS attended the webinar. It was well-done and very well-received. The presenters both talked about rookie mistakes and other incidents in the laboratory.

Eventually, the webinar will be available for viewing from the ACS website. Since it was a regular seminar day, a number of grad students were not able to view it. Once the webinar is available, I'll let you know.

Building Project Update

The general updates are as follows:

- **Chemistry Rooms 1, 3, & 92 Remodel (chilled water loop)** – Project is underway and the contractor is moving swiftly through the basement. Check the bulletin board across from Chemistry 122 for project drawings and schedule.
- **Storm Drain Corrections**—Excavation begins in the courtyard on November 6th. Please be aware and avoid the area.
- **Chemistry Safety and Security**—The bids have been received and the contract documents under review. This project should kick-off early next year.

Earthquake Safety

A March 2015 U. S. Geological Survey (USGS) forecast predicts that the probability of a 6.7 or greater earthquake within the next 30 years is 72% for the San Francisco Bay region and 60% for the Los Angeles area. Given the high probability of such a catastrophic earthquake, we must all prepare both at home and at work for the "Next Big One," because what we do before the earthquake will determine what our lives will be like afterwards.

The user-friendly **Earthquake Secure Your Space checklist** is designed to assist UC employees in preparing their workspaces for the *next big one.*

Fire Prevention in the Workplace

If the fire is *inside* your space:
Call *911* from a safe location.

Use an extinguisher *only* if the fire is small and it is safe to do so.

Warn others in the immediate area and on your entire floor.

Evacuate using *stairwells* - do NOT use elevators.

Close all doors behind you.

If the fire is *outside* your space:
Feel the door before evacuating - do NOT open hot doors.

If trapped, seal the bottom of the door to help prevent smoke from entering.

Call *911* to report your exact location in the building.

If the door is cool, open it carefully and evacuate if safe to do so.

Fire Prevention & Safety
Know the locations and evacuation routes to all building stairwells.

Never use the elevator if there is fire or smoke in the building. If you are stuck in an elevator, use the elevator phone to call for assistance.

All-purpose ('ABC' dry chemical) fire extinguishers should be located throughout buildings in hallways, offices, break rooms, and lobbies.

ENSURING SAFE LABORATORIES

READING ABOUT the lab explosion at the University of California, Berkeley (C&EN, Aug. 24, page 36), took me back to my third year as an undergraduate, during the summer of 2002. I synthesized about 1 g of tetramethylammonium permanganate and was using a metal spatula to transfer the compound from a small glass filter frit when the compound exploded. I, like the student in the UC Berkeley incident, "became a little complacent" but was lucky to avoid lasting injury.

Incidents such as this highlight the need for earnest laboratory safety training early and throughout undergraduate chemistry programs. As undergraduates transition into graduate studies, and later on to professorships and industry positions, they can carry with them (and pass on) their training. Perhaps a self-perpetuating approach to laboratory safety training such as this can stave off complacency.

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ACADEMIA CONTINUES to follow more of the same, which evidence shows to be inadequate. Turning young researchers back to reviewing material safety data sheet (MSDS) documents and reviewing standard operating procedures is not the answer to hazardous operations safety. It is, however, a first step. It is imperative to know that one is working with a hazardous material. What is missing is how to proceed.

Government and industry have learned that established good practices in and of themselves do not ensure safety. The answer lies with the application of safety analysis to selected hazardous operations. Safety analysis identifies potential accident pathways; provides estimates of likelihood, consequence, and risk for each; and identifies controls for those scenarios that require risk or consequence reduction.

For this type of operation, a formal written procedure, which is followed diligently, would be required. The safety analysis would analyze each step of the procedure with attention directed to human errors, equipment failures, and other concerns. In many cases, the procedure is analyzed while working simultaneously with an inert simulation.

Why aren't good practices good enough? Part of the answer is that even the most diligent researcher has a human error probability of roughly 0.001. Additionally, even the best apparatus may have incipient weaknesses. Another possibility is that the procedure or apparatus might not be quite as robust as originally perceived.

Operations and equipment for hazardous operations in government and industry are routinely modified and tweaked when developed side by side with safety analysis. For the UC Berkeley example, two possible initiating events are selecting the wrong spatula by mistake and having a sample fall off a plastic spatula onto a metal ring stand base. More information on the experiment, procedure, and laboratory environment would surely result in more scenarios to evaluate and control if necessary.

There are other issues as well, such as the extent to which the material has been characterized regarding sensitivity to abrasion, impact, static, heat, light, etc. What quantities are appropriate for direct-contact laboratory operations? When is a blast shield required?

The intent of safety analysis is not to impede research or creativity, but rather to identify when hazards require additional evaluation and control to ensure that work proceeds as intended. One collateral benefit of safety analysis is that it also identifies operational and product quality issues that are useful to recognize before one assembles the equipment or begins the work.

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