Quarterly Laboratory Safety Update

This quarterly slick:

- Hazardous waste management done right
- How to safely transport hazardous materials from point A to point B
- Little Fires Everywhere - Batteries and how to store them safely
- Packaging matters - air-sensitive chemicals
- Stay with us to the end to learn few lab hacks for .....Do you have a favorite lab hack that safes time and frustration? Share it with us so others can learn about it too.

Need training? Click here for details on upcoming courses.

Although clear guidelines for hazardous waste management are in place, non-complaint waste is the #1 finding during our annual lab safety reviews.
We are attempting to change the statistics. Starting this month after waste collection you might find in the lab a checklist as the one shown above that indicates areas for improvement within your lab hazardous waste management. EH&S would arrange for an in person refresher training for the group if waste management does not noticeably improve with the help of these notes.

Hazardous Chemical Waste Management Done Right

There are a few simple rules when it comes to proper hazardous chemical waste management:
1. Do not dispose of hazardous waste in the sink or in the regular trash. Rather request a pick up through EH&S' website.
2. To do so you need to first select a chemically compatible waste container. The material stored in the container should not react with the lid or the container.
3. Containers must be completely sealed to prevent spillage. The waste container should be open only when waste is added to it.
If you generate Aqua Regia solutions, Piranha Solutions, Nitric acid waste, contact EH&S to receive free venting caps. For more info, view Vented Cap Video.
4. Store the waste in a designated hazardous waste storage area. Provide secondary containers to i.) capture any spills and leaks from the primary containers and to ii.) segregate incompatible chemical waste. This is especially important in an earth quake country such as Santa Barbara.
5. Tag every waste container with the official hazardous waste label. Include full date in the following format: mm/dd/yyyy. Indicate the physical state of the waste and its chemical hazard classification. Complete all sections of the hazardous waste label when waste is first added to the container.
6. Request a pickup when the waste is 9 months old or when full (whichever occurs first).
Questions? Please contact the Hazardous Waste Manager, Bruce Carter.

TRANSPORTING HAZARDOUS MATERIALS

Often times research involves the transportation of hazardous materials across campus or off campus. Occasionally these activities end with accidents. Like the bottle of tetramethylammonium hydroxide (an acutely toxic chemical) which recently slipped out of

hands and shattered on one of our building's hallway floor. Or the case where a UCSB scientist was transporting formaldehyde (a carcinogen) in their private vehicle without a secondary containment. The lid of the container broke and formaldehyde spilled on the car's interior. The container was not properly labeled and the formaldehyde's concentration was unknown. The odor persisted for several days.

How incidents like those described above can be prevented? And how can you ensure that you or no one else will be exposed to chemicals should you transport chemical containers? When transporting hazardous materials intra- and inner- campus buildings or off campus it is crucial to provide a secondary container with a volume at least 110% of the hazardous material you are transporting. A large enough secondary container would prevent spills of or exposures to the material during transport.

A secondary container should be break resistant and easy to decontaminate.For inner building transportation of just one container a safety bottle carrier as the one shown on the picture on the right is preferable.

The use of carts reduces the chances of dropping chemical containers on the floor. Cart use is recommended but does not negate the requirement for use of a secondary container.

When transporting hazardous materials off campus with a vehicle make sure that a secondary container is in place. Discuss coverage scenarios with your insurance carrier if you are using your private car. Your insurance company would be the primary payer if an accident occur and there was harm to others. Some private carriers may not cover bodily injury to the driver or others if the hazardous material being transported is the cause of the injury.

Be mindful when transporting chemicals in public areas and don't touch anything with gloves outside of the lab. Don't leave the hazardous materials unattended. Contact EH&S for the transport of highly hazardous chemicals such as Explosives, Pyrophorics, Water Reactives, Shock sensitive materials, etc.

Runaway Hot Plates

"In recent years, there have been numerous reports of “runaway hot plates”. This is to say, hot plates that heat uncontrollably regardless of the temperature setting or whether the controls are in the off position. "

"*Catching up with Runaway Hot Plates", Pickel et al., Journal of Chemical Health & Safety, March/April 2019*

The Problem:

Spontaneous and unexpected heating of hotplates has been the cause of laboratory fires and explosions.

In 2005, Lawrence Berkeley National Laboratory issued a safety advisory related to a Corning model PC 420 hot plate.

In 2007, 2011, 2012, 2014 the University of California, University of Pennsylvania, MIT, and Oak Ridge National Lab issued similar safety advisories for Corning PC-35, PC-200, PC-220, PC- 351, Fisher IsoTemp and the Thermolyne Model:SP46925.

The Causes:

- Hotplates manufactured from 1960s – 1980s may still be in active use. Hotplates in disrepair may be in use.
- Older hotplates with relay heater switches can spontaneously heat in the heater dial OFF position.
- Liquids in contact with electronics may cause shorts. Newer hotplates with TRIAC or microprocessor-controlled heater switches may spontaneously heat in the OFF position due to liquid exposure to the electronics.
- Hotplate/stirrer combinations may be used when only stirring is required.
- Hotplate/stirrer combinations generally stay plugged in even when inactive.
- Temperature sensors may be misplaced, fall out or malfunction.
- Similarity of heating/stirring control dials and left /right reversal of control dials on hotplates from different manufacturers can lead to user errors.
- Users may not read user manuals.

Reference: *MIT PowerPoint Presentation: Kamikaze Hot Plates*

What can you do to **prevent hot plates incidents happening** in your lab?

- Discard old hotplates. Hotplates purchased prior to 1984 do not have temperature feedback controls. These models include the Corning PC-35 and PC-351 and the Thermolyne Model: SP46925.
- When only stirring is required, acquire and use a stirrer instead of a hotplate/stirrer combination.
- Unplug inactive hotplates or heating mantles, especially when in close proximity to oil baths, combustible or flammable material.
- Select hotplate housing designs that are less affected by spills and aggressive environments. Where liquid spills can be anticipated (i.e. water cooled reflux) do not use hotplates that have open housing designs.
- Look for hotplates with two independent temperature control circuits, which switch off heating in case of an over temperature situation.

Reference: *Northwestern University Office for Research Safety and Emory University*

News for the Field Researchers

Epi Pen for the First Aid Kit

If you lead large groups of students in the field you might think that having an epinephrine auto-injector (epi pen) on hand can be useful. As of 2017 state laws have been updated to allow businesses and public agencies to keep epinephrine auto injectors in their first aid kit to help treat emergency allergic reactions. In order for this to happen several training and certifications and some documentations are required. To encourage field research leaders to take advantage of this program, EH&S will soon be able to provide epi pens on a temporary base to those who have completed the required training (CPR/AED training and approved Epinephrine Auto-Injector Training). If you are interested or if you have questions, please contact Nelly Traitcheva.

Lab Hacks for Stirring Plates/Bars

1. When the magnetic bar doesn't couple with the stirring plate (common for large volumes flasks) put a bar on the top of the stirring plate between the plate and the flask. The stirring plate magnet will stir the first bar, and this bar will easily stir the reaction flask's bar.
2. Tired of dealing with clumps when preparing media for your bacterial culture? Simply add the water to the flask first and start to stir it. Then gradually add all other ingredients to the water, while continuing to stir. You will be happy to see no clumps in your media.
3. Every time you are pouring a reaction mixture out of a flask in which you have a stirring bar in, don't let it roll into the recipient. Just hold a magnet (or another large magnetic stir bar) against the glass while transferring your solution, keeping the bar in the first reaction flask. This is especially useful when it comes to transferring mixtures to a separatory funnel. It is nothing pleasant to end up with a stirring rod inside the funnel, or in a residues container, or down the sink for that matter.

Hey! Don't forget to share your favorite lab hacks with us! We will publish them in the upcoming issues. Thank you!

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