ISSUE 6 ○ Summer 2018

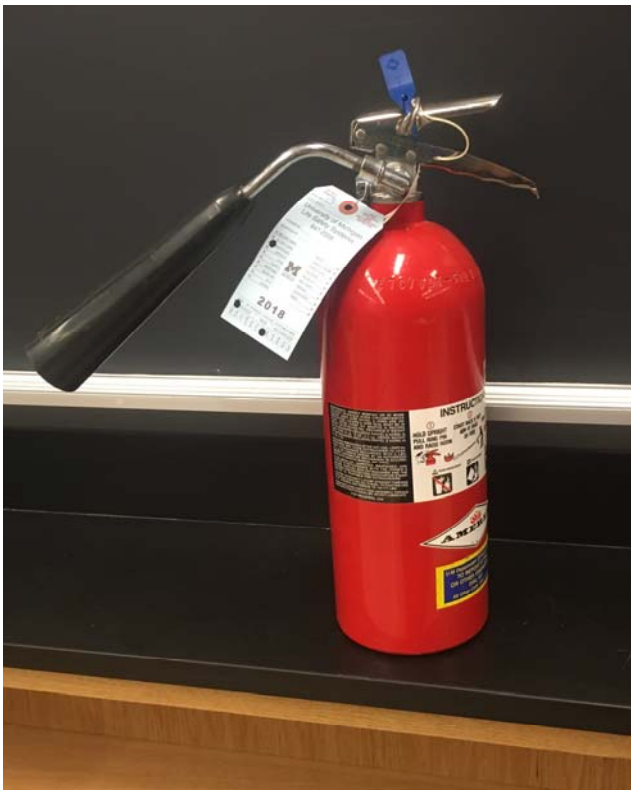
Safety first

BRINGING A SAFETY WORKPLACE TO ALL MEMBERS OF THE CHEMISTRY BUILDING

What to Do in Emergencies

Since we have recently had several small fires in the building, this is a good time to review reporting requirements if there is a fire.

- Only attempt to put out a fire if you have gone through the proper training (given every fall) AND you feel comfortable trying to put it out.
    - ◊ **No one here is ever "expected" to fight fires**
- If there is ANY unexpected fire in your lab, even if you put it out immediately or it is just momentary, it must be reported to DPSS (911 or 3-1131) AS SOON AS IT'S SAFE TO DO SO.
- Additionally, like all emergencies call both Christopher Peters (3-4527) **AND** Tracy Stevenson (4-7316) ASAP (Leave Voicemails if no one answers).



PPE Reminder

Please remember that safety glasses are required in ALL wet labs even when passing through.
Although some labs may not regularly work with extremely hazardous materials there are still many chemicals in those labs that would do severe damage to the eyes if they were to splash into them.

Exhaust Fan Fire

On 5/09/18 at approximately 5AM, a member of the janitorial staff reported a smoke smell on the 4600 hallway of the building as well as a gas alarm going off outside of room 4630. The staff member called the Department of Public Safety and Security (DPSS) who had them evacuate the building and pull the fire alarm on the way out. DPSS then contacted the Ann Arbor Fire Department as well as the building manager.

Upon arrival, no smoke smell was detected The gas alarm detector showed carbon monoxide levels of 324 PPM but AAFD's instruments indicated 0 PPM showing the likelihood of the false alarm from a faulty sensor. The alarm was silenced and it was noticed that the hoods in the lab were in alarm for no exhaust.

DPSS and AAFD left the premises and the building manager went to the penthouse to check on the exhaust issue. Upon entry to the penthouse stairs, a strong odor of burnt rubber was noticed. At the exhaust fans it was found that the shroud surrounding the fan belts was burned and there were charred burnt pieces of fan belt and paint remnants surrounding the fan. Glowing embers were also found inside of the shroud.

DPSS and AAFD were called back and the glowing embers were put out with a water based extinguisher after the power had been shut off to the motor.

Glowing embers from fanbelt

What appears to have happen is as follows: A fanbelt broke on the exhaust fan and somehow became wedged between the shroud and the drive shaft causing the belt to heat up until it caught fire. The fire itself occurred in a single spot and did not spread so the fire systems did not get set off. The fire did shut off the supply air to the labs which is what caused the hoods to go into alarm. This also caused a small amount of smoke to backflow into the gas cabinet which saturated the carbon monoxide detector setting it off.

The exhaust fans not involved with the fire were brought online later that morning and research was allowed to continue as normal. The fan that was involved in the fire was replaced and the carbon monoxide detector was recalibrated.

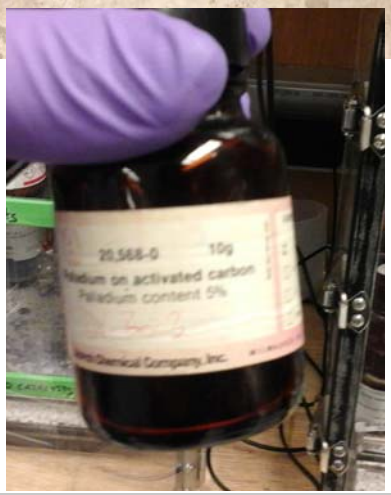
This incident was a freak accident and no one including the manufacturer of the fans has ever heard of something similar happening. Although this incident was not lab related it shows the importance of paying attention to alarms and know what they mean. In this instance both the local gas alarm was sounding and the hoods were in alarm for low flow.

If the exhaust on your hoods is not working or your hoods are in alarm please refrain from working in the hood and contact Tracy Stevenson (4-7316) or POCC after hours (7-2059).

Lessons Learned

Small Palladium on Carbon Fire

Campus Police and the fire marshal were called to investigate a small fire on April 11th, 2018 that resulted from a routine hydrogenation reaction. The reaction used palladium on activated carbon (Pd/C) as the catalyst and hydrogen gas as the hydrogen source. Pd/C is a highly flammable reagent that is sensitive to spontaneous oxidation by oxygen in a vigorous reaction, causing sparks. This type of reaction is well established and was successfully conducted on a small scale, however, poor reactivity of the starting material revealed in a previous experiment, meant larger Pd/C quantities were used in this experiment.



In this incident, a balloon filled with approximately 500mL of hydrogen and equipped with a thin steel needle, pierced through a rubber septum at the outlet, was already prepared in order to generate a H_2-atmosphere in the reaction flask after preparation of the reaction mixture. The balloon was placed about 50cm away from the reaction flask in the same fume hood with hydrogen slowly flowing out at the tip. The prepared amount of Pd/C was poured into a flask containing the starting material. The exposure of the Pd/C to air during the pouring process caused a sparking reaction. The sparking reaction in the presence of hydrogen gas caused a small flame at the needle tip in the balloon that spread to the rubber septum. The flame was extinguished using a CO_2 fire extinguisher. The remaining H_2 slowly flowed out into the fume hood, which remained under observation until it was empty.

Pd/C is a highly reactive material that should be used with the utmost care. Appropriate PPE including a FR labcoat, safety glasses and gloves should always be used when handling it. Additionally, PI's should be consulted before scaling up a potentially dangerous reaction such as one involving Pd/C.

Cigarette Can Fire

Another fire incident occurred outside of the building around 9:30am. Around that time students began noticing the garbage can on the northwest corner of the building billowing smoke. Officers from DPSS and Christopher Peters were contacted about the incident.

The fire was contained in a small trash can designated for putting out cigarettes and located next to the normal trash can. At the time of the fire the can was between 1/3 and 1/2 full of cigarette and cigar butts A dry chemical fire extinguisher was removed from the hallway inside of the '08 building and used to put it out. Unfortunately after several minutes, smoke continued to come out of lower areas of the can. A carbon dioxide extinguisher was then used to completely smother any remnants.

Grounds is currently reassessing the use of this kind of cigarette collection device on campus.

If you see anything out of the ordinary even if its happening outside of the building please let Tracy, Chris or Anson know.

Lessons Learned (Continued)

MedChem Benzyl Chloroformate Explosion

A 100 gram bottle of liquid benzyl chloroformate was borrowed from a neighboring laboratory. In that lab, it was being stored in a –20° freezer. As the student was preparing other reagents for the experiment, the benzyl chloroformate was left in the hood at room temperature. The student was facing towards the hood when the bottle of benzyl chloroformate violently shattered from an apparent over-pressurization. This was mostly likely due to moisture spontaneously reacting to decompose and form benzyl alcohol, as well as HCl and CO2 as byproducts.

At the time of the accident, the student was wearing safety glasses but not a lab coat. Their upper left arm was cut from a piece of glass from the broken bottle, and some of the chemical splashed onto their face as well. The student immediately took off their contaminated clothing and rinsed in the safety shower for around 10 to 15 minutes. They were then taken to Occupational Health and Safety (OHS) and later the Emergency Room to get looked at.

This incident shows the importance of wearing proper PPE. In this instance a labcoat would have provided some protection against the chemical exposure and glass.

This incident also shows the importance of purging chemicals that may build up pressure such as benzyl chloroformate. Even though the bottle has a sure-seal to prevent air or moisture from getting inside some chemicals including this one can build up pressure over time. Additionally, the drastic temperature change from –20° C to 20° C likely helped this pressure buildup.

Hand Cut

A graduate student was cleaning a 600 milliliter beaker. Without noticing that the rim of this beaker was fractured, the student wiped the rim with a paper towel and accidentally cut themselves underneath their finger. The student quickly rinsed the cut with soap and water and a coworker took the student to the Emergency Room after, where the student was given two stitches and received a tetanus shot.

Glass cuts are the number one injury in the Chemistry building and extra care must be taken when handling glassware in case of chips or breaks in the glass.

A Safer Setup for Transferring Pyrophoric Reagents

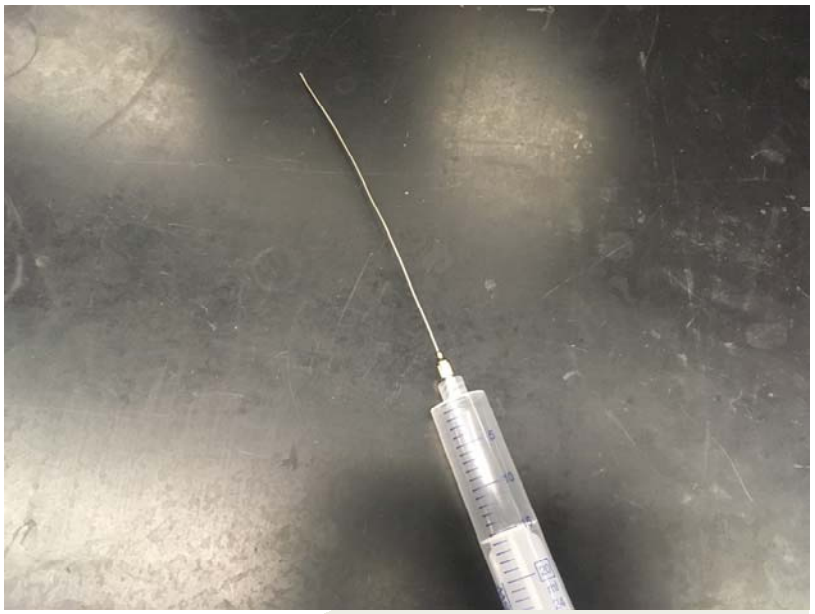
In June, the magazine C&EN covered a new, safer setup for transferring tert-butyl lithium and other pyrophoric reagents.

Normally, pyrophoric materials are transferred in a process involving inserting a very long and thin needle into the rubber covering at the top of the bottle and then using an attached syringe to draw the desired amount of reagent out of the bottle, much like a doctor would draw blood from a vein. However, this protocol can be dangerous, especially for inexperienced chemists. If done incorrectly the material could drip or squirt out of the syringe and immediately ignite. Chemists at Aarhus University in Denmark have come up with a new setup and protocol that makes pyrophoric transfers much safer.

According to C&EN "The setup consists of a sealed transfer vial made by fusing the tops of two crimp neck vials, a three-dimensional printed bottle cap that screws onto the bottle of pyrophoric reagent and holds the transfer vial, and a metal clip that secures the system so that it's "hands free."

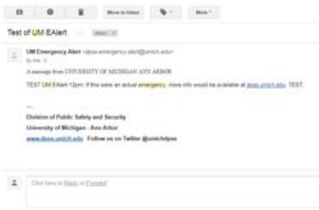
To transfer the reagent once the setup is assembled, a chemist pushes a long needle through both crimp cap seals on the transfer vial (which is filled with inert gas) and then through the reagent bottle rubber seal. The chemist draws the required amount of reagent into the syringe and then withdraws the needle so that it is contained within the transfer vial. After removing the transfer vial from the 3-D printed bottle cap, the chemist places the transfer vial onto the reaction flask, pushes the needle through the transfer vial and through a septum on the reaction flask, and finally transfers the reagent (*Org. Proc. Res. Dev. 2018, DOI: 10.1021/acs.oprd.8b00151).*"

To read this complete article as well as to a very helpful video about the setup please go to: https://cen.acs.org/safety/lab-safety/Setup-make-transferring-tert-butyl/96/web/2018/06



Credit: *Org. Proc. Res. Des.*

UM Emergency Alerts



The University of Michigan has an mass notification alert system for faculty, staff and students.
This system will be activated during incidents of severe weather, active violence incidents such as an active shooter or a major hazardous materials spill. The system is only used for tests and real alerts so you don't have to worry about unwanted messages.
To sign up for the alerts simply go into the Self Service screen Wolverine Access. The alerts are located under Campus Personal Information.
You have the options to sign up for getting alerts via email, phone or text message. It is highly recommended that you sign up for all options. The alerts often come several minutes apart so signing up for all of them will ensure you receive them as quickly as possible.

To sign up for the alerts simply go into the Self Service screen Wolverine Access.

Upcoming Inspection

Always Be Ready!

An MDEQ inspection occurred in south campus in early August. They will likely revisit central campus in the next year. We must always strive to keep our labs in compliance both for the regulators and to keep ourselves and our labmates safe.

Events

Classes begin (Fall)	Sept 4, Tues
Fall Study Break	Oct 15-16, Mon-Tues
Thanksgiving Recess (5:00pm)	Nov 21, Wed
Classes End	Dec 11, Tues
Study Days	Dec 12, Wed & Dec 15-16, Sat-Sun
Exams	Dec 13-14, Thur-Fri & Dec 17-20, Mon-Thur
Grades Due	72 Hours After
Commencement	Dec 16, Sun

Dry Ice/LN2

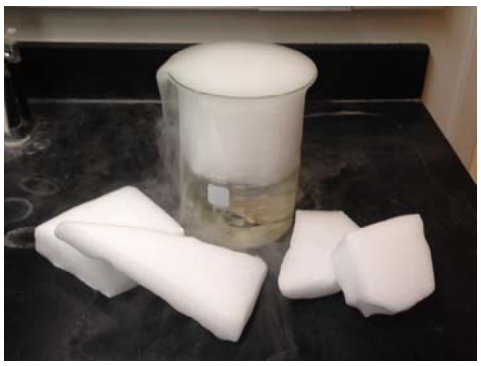
Dry Ice

Dry ice is available from 10:00am-11:00am and from 2:00pm-3:00pm Monday-Friday in room A601

Liquid Nitrogen

Department dewars are accessible 24 hours a day outside of room A602 for small (under 15L) liquid nitrogen quantities.

Large dewars of liquid nitrogen can be ordered by emailing chrpeter@umich.edu or steventi@umich.edu at least one business day before it's needed.



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Maintenance Requests
Routine Work Request Form on Chemistry Intranet

This puppy wants you to be safe