ENVIRONMENTAL HEALTH AND SAFETY

Lab Chatter

UNIVERSITY OF NEW ENGLAND
INNOVATION FOR A HEALTHIER PLANET

Volume 3, Issue 6, March 2017

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Purchasing Tax-free Alcohol for Lab Use by Peter Nagle

The purchase of tax-free alcohol (190 proof or higher) requires an Industrial Alcohol Users Permit, issued by the Alcohol and Tobacco Tax and Trade Bureau (TTB). Tax-free alcohol is pure or un-denatured alcohol that can be used for scientific purposes by the university. However, the use of tax-free alcohol is regulated to prevent illegal diversion to taxable beverage use. Below are general guidelines for purchasing and managing tax-free alcohol.

Tax-free alcohol can only be used in the following manner:

- **Preserving specimens**
- **General reagent work in chemical laboratories**
- **Scientific research**

Tax-free alcohol must be managed in the following manner:

- **Containers must be secure at all times.**
  - **Store in a locked cabinet.**
  - **If a cabinet is unavailable, lock the laboratory door when the lab is unoccupied.**
- **Tax-free alcohol cannot be transferred off campus.**
  - **This includes transferring tax-free alcohol between UNE campuses.**
- **Under no circumstances can tax-free alcohol be used for human consumption.**
- **An accurate inventory must always be kept.**
  - **This includes alerting EHS of any container that has been consumed.**

The Environmental Health & Safety Department at UNE manages the permits for both campuses and all applicable state licenses associated with each permit. If you need to purchase pure alcohol, please contact Peter Nagle in the EHS Department. The following information is needed for procurement: catalog #, PO#, and account # the alcohol will be purchased under.

LAB SAFETY INSPECTION HOT LIST 2016-2017

By Jessica Tyre

Now that the Fall 2016 semester is behind us and we are a few months into the Spring 2017 semester, we would like to share some of the most common lab safety compliance issues that can be improved upon in UNE labs. As a university, we believe in continuous improvement and setting our organization up for success. The UNE EHS department is always striving to find ways to make the UNE community more safety conscious and create more awareness that brings us to the next level in safety. EHS has always found the lab staff to be cooperative and supportive of UNE's safety goals, and we think that says a lot about the safety culture here. So before we continue, we would like to thank everyone for working with EHS and keeping everyone's safety the first priority in the workplace.

EHS conducts lab safety inspections in every laboratory once each semester (twice a year). We look at several items in each category on the inspection checklist. The categories on the checklist are: General Safety & Environmental Conditions, Fume Hood Safety, Safety and Emergency Response Equipment, Electrical Safety, Chemical Safety, Hazardous Material Storage, Compressed Gas Cylinders, Hazardous Waste Disposal and SAAs, Safety Training, Chemical Hygiene Plan, General Biosafety, Radiation, and Laser Safety. There are anywhere from five to twenty questions under each category. The below list changes from year to year depending on many factors such as lab staff changes, regulatory updates, EHS focus, etc. These are the compliance items that labs could improve upon to create a safer environment:

- Conduct weekly or even monthly eyewash station inspections and notate date and initials on inspection tags.
- Do not use extension cords as permanent wiring.
- Periodically re-stock supplies in first aid kits (especially bandages as they are the most commonly used item).
- Do not overfill broken glass boxes and please remember to place a Facilities work order with "moves" to have the box picked up once filled.
- Label secondary containers for chemicals with their name (no abbreviations) and their primary hazard.
- Label edible household products found in labs as "For Lab Use Only" or "Not for Human Consumption". Ice machines in labs should also be labeled "Not for Human Consumption".
- Inspect hazardous waste satellite accumulation areas (SAAs) every seven days on the Biddeford campus.
- Stock safety eyewear in the laboratory (safety glasses or splash goggles) where hazardous chemicals are present.
- Keep a copy of the UNE Chemical Hygiene Plan specific to the lab on file in the lab area either electronically or by hard copy.

Do not let this list intimidate you or your lab staff in any way. These are just items most labs could improve to enhance the safety compliance in their area. The list of things that laboratories are doing well in regard to safety is far longer than this list so you should definitely not feel discouraged. If you ever have any questions or concerns after receiving your EHS Lab Safety Inspection Report, please feel free to reach out to us and let us know how we can assist you. EHS is your partner in lab safety! Keep up the great work everyone!

SAFETY CONCERNS WITH Li-ion PORTABLE POWER BANKS

BY RONNIE SOUZA

In recent months, there have been a number of stories in the news about portable power banks (portable device chargers) overheating and exploding on the body of the user. Most of these incidents have occurred while the user was charging their phone with the power bank in their pocket. As it turns out, UNE Students are not immune to these events occurring. UNE Security Department has responded to student reports of power banks becoming extremely overheated and "too hot to handle". In a recent incident at UNE, a student was charging their phone in a winter coat pocket when it overheated, becoming too hot to touch with a bare hand. Due to safety concerns, the UNE student surrendered the defective power bank to UNE Safety & Security for safe removal and disposal.

As to why a power bank would suddenly heat up or explode, there are three likely causes:

1) Poor Battery Quality

Batteries are the major components of power banks. It is the most expensive part when you cost it individually. Most of the power banks on the market are manufactured with Lithium-ion or Lithium-Polymer batteries, though the former is a cheaper option. Manufacturers, (in a bid to keep prices down) tend to use the Lithium- ion batteries to save costs. In worst case scenarios, some manufacturers go to the extent of using recycled Lithium-Ion batteries. This increases the chances or likelihood of explosion at a later time. **Buyer beware of cheap power banks!**

2) Wrong Circuit Design

The internal circuit design of a power bank is another likely cause of explosion. For a power bank, a good circuit design entails the following:

- Power protection: A well-made power bank should have power protection. Power protection is a mechanism that ensures that the battery stops charging once it has reached full capacity.
- Short circuit control: A good power bank should have a circuit fully insulated to prevent short circuit. (Short circuit means touching of wires.)
- Temperature control: The ideal power bank should have a temperature control such that once it reaches a particular temperature, it shuts off and cools down.

If one or more of these are not built-in to the power bank, the chances of an explosion in the future are high.

3) Improper Handling or Wrong Usage

Improper usage or mishandling a power bank by the user can unknowingly cause damage and impact the safe use of the power bank. Dropping a power bank onto hard surfaces, even once, can damage the power bank. Exposing power banks to high temperatures or humidity can create conditions that can cause explosion. Improper ventilation while re-charging the power bank or charging your device with the power bank can cause a power bank to overheat and possibly explode. Overcharging of power banks is bad practice, especially when it does not have any of the power protection like explained above. Never charge a device unattended as it could overheat resulting in a fire.

What to Do When a Battery Overheats:

When a Li-ion battery overheats, hisses or bulges, immediately move the device away from flammable materials and place it on a non-combustible surface. Never attempt to put out a Li-ion fire unless you have proper training and extinguishing material available.

Extra Precautions Required in Laboratory Environments:

An overheated or exploding power bank presents a clear danger to students, faculty and staff who study and work in laboratories that contain hazardous materials. A Li-ion fire burns at roughly 1000 °F, introducing toxic, flammable, corrosive and reactive chemicals into the reaction is clearly a recipe for disaster. Always use your power bank devices as designed and be alert for warning signs of damage or failure.

Anyone with questions or needing assistance regarding portable power banks or Li-ion batteries should contact the UNE Environmental Health & Safety Office:

Ron Souza, RSO, Director EH&S
T-207.602.2488, C-207.391.3491

Photo credit: Google images (not a UNE student).

Lock Out/Tag Out and Why It's Important

By Samantha Hardy, EHS Intern

Editor's Note: *You may be asking yourself, why include an article on Lock out/Tag out in a laboratory publication? The answer is simple. Labs contain several pieces of electrical equipment they may need to be locked out or tagged about by UNE staff members. Examples include malfunctioning fume hoods, -80 freezers, incubators, ice machines, etc. If these pieces of equipment are disabled it is important for all lab staff to understand this procedure.*

Lock out/Tag out (LOTO) is an important procedure that prevents injuries due to hazardous energy. Electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy sources found in machines are the sources of hazard. If machines and equipment need repair or maintenance and do not undergo LOTO procedures, they can severely injure workers. Machines with stored energy may start up unexpectedly causing electrocution, burns, crushing, cutting, lacerating, amputating, or fracturing of body parts.

Roughly 3 million workers who service equipment routinely face this risk of injury when proper procedures are not followed. Hazardous energy injuries often lead to an average of 24 missed workdays. OSHA requires employers to establish a LOTO program, which includes procedures, employee training and periodic inspections to ensure no workers perform any service or maintenance before the equipment is isolated from the energy source and rendered inoperative.

- Lock out- A device that uses a lock and key or combination is placed on the energy isolating device. This prevents operation until the lockout device is removed.
- Tag out- A tag is securely fastened to an energy isolating device to alert workers that the equipment cannot be operated until the tag out device is removed.

Preparation

1. Before deciding on a lock out or tag out device, a job site evaluation must be performed. This includes identification of equipment being worked on, energy type and source, and affected personnel, as well as verification that the machinery or equipment may be locked out or tagged out.

2. Tag out devices are only used in the instance that a lock out device cannot be used or is unavailable.

3. LOTO devices must identify the employee who attached it. They must be able to withstand weather or accidental removal. Tag out devices cannot be used more than once.

Procedure:

1. Employees must be aware of the type and magnitude of energy, the hazards to be controlled, and the methods to control the energy.

2. A supervisor and all affected employees must be notified.

3. The machine is then shut down to isolate it from its energy sources. Stored energy found in springs, parts of equipment that are elevated and could drop, rotating fly-wheels, capacitors, hydraulic systems, etc. must be dissipated or restrained.

4. LOTO devices are affixed to energy isolating devices in "safe" or "off" positions. All potentially hazardous stored or residual energy shall be relieved, disconnected, restrained or otherwise rendered safe.

5. Prior to working on a machine that has been locked out or tagged out, employees must verify that isolation and degeneration of the machine or equipment have been accomplished. They must also verify power to equipment is off. Then they may return operating controls to neutral or off and begin performing work or maintenance.

6. After maintenance is complete, the work area is cleaned to remove all nonessential items, inspect the machine or equipment, and then LOTO devices may be removed from the machine or equipment by the employee who placed them, unless they are unavailable. If another employee must remove the devices, they must be up to date on their annual LOTO training at UNE and their name will be documented in the LOTO log as the person who removed the device rather than the person who placed the device.

Sources: www.osha.gov and www.une.edu/campus/ehs

Check chapter 8 on page 86-92 of the UNE Environmental Health and Safety Manual of 2017 for more information on LOTO procedures and protocols at UNE.

1. Test tube
2. Boiling Tube
3. Beaker
4. Conical/Erlenmeyer flask
5. Volumetric flask
6. Round-bottomed flask
7. Florence flask
8. Kjeldahl Flask
9. Pear-shaped flask
10. Retort flask
11. Schlenk flask
12. Straus flask
13. Buchner Flask
14. Separating funnel
15. Dropping funnel
16. Filter funnel
17. Thistle funnel
18. Liebig condenser
19. Graham condenser
20. Friedrichs condenser
21. Distilling column
22. Claisen flask
23. Soxhlet extractor
24. Gas syringe
25. Thiele tube
26. Chromatography column
27. Graduated cylinder
28. Graduated pipette
29. Volumetric pipette
30. Burette

Burned Out!

Laboratory fires are all too common and can be devastating, not only for the source lab, but surrounding labs as well.

By Vince McLeod | March 09, 2016 *(via LabManager.com)*

Contributed by Jessica Tyre

Safe Use of Flammable Solvents in the Lab

One event we constantly try to prevent is a laboratory fire. Unfortunately, they are all too common and even "small" ones can cause tremendous damage and adversely impact not only the immediate lab where the fire occurred but also most adjoining labs. And large fires can be devastating, destroying the source lab and sometimes the whole building. So, whenever we encounter the use of flammable solvents, our antennae go up and we take extra notice.

Flammable solvents are those that can easily catch fire and burn. This article will focus on liquids because, according to Prudent Practices, the most common fire hazard in the typical research lab is a flammable liquid or the vapor produced by one and the laboratory violation we hand out most often deals with use and storage of flammable liquids.

If we recall our safety training regarding flammable solvent use and the basic "fire triangle," three conditions must exist simultaneously for a fire to occur: an oxidizing atmosphere (usually air), a source of ignition, and a concentration of flammable gas or vapor within its flammability limits. If any one of these is absent, a fire will not occur. Controlling flammable vapors and gases and eliminating potential ignition sources are the best ways to reduce the fire hazard, since air is nearly always present.

Flammable and combustible substances—different physical properties

There are a few important concepts to understand at the outset. The first is the difference between flammable and combustible materials. The differentiation is based on flash point—the lowest temperature at which there will be enough flammable vapor to ignite when an ignition source is applied. Flammable liquids are more dangerous, because they have a flash point below 100°F (37.8°C). Combustible liquids have flash points between 100°F and 200°F (93°C). A closely related term is vapor pressure. Every liquid has a vapor pressure, which is a function of that liquid's temperature. As the temperature increases, the vapor pressure increases. As the vapor pressure increases, the concentration of flammable liquid vapor in the air increases. Therefore, temperature determines the concentration of vapor in the flammable liquid in the air. A certain concentration of vapor in the air is necessary to sustain combustion, and that concentration is different for each flammable liquid.

The next important concept is the flammable range— the range between the upper and lower flammable limits. Flammable limits are expressed as percent volume in air. Concentrations above the upper flammable limit (UFL) are too rich to burn (too much vapor) and concentrations below the lower flammable limit (LFL) are too lean to burn (not enough vapor). The most dangerous materials are those with the lowest flash point and widest flammable ranges.

The National Fire Protection Association's (NFPA) *Flammable and Combustible Liquids Code*, NFPA 30, is an excellent resource and introduction to the hazards of these materials.[2] And if you are interested in details, NFPA 30 further classifies flammables as Class I and divides them into Class IA, IB, and IC, while combustible materials are classified as Class II, IIA, and IIB, all based on flash points and boiling points. NFPA 30 also rates the fire hazard of flammable and combustible materials on a scale of 0 to 4 based on flash point. This rating helps you quickly assess the potential danger of a substance. Zero is the least hazardous and indicates the material will not burn. A rating of 1 is given to materials with flash points above 200°F and indicates the material needs to be preheated to burn, while flammables with flash points below 73°F are rated a 4 and are extremely flammable and the most dangerous.

Important guidelines for storage of flammable and combustible materials

The one issue we see cited most frequently is having excessive flammable solvents in the lab. NFPA 45, *Fire Protection for Laboratories Using Chemicals*, is the first reference we turn to as it provides universal guidelines for safe storage.[3] The maximum quantity of flammable and combustible materials that can be stored in the lab is set in NFPA 45, and this is how labs are classified. Chapter 4 of NFPA 45 classifies laboratories into four fire hazard categories based on the amount of flammable and combustible material in the lab. These are Class A (high fire hazard), Class B (moderate), Class C (low) and Class D (minimal). Examples of Class D are high school educational laboratories, while college level undergraduate labs are usually limited to Class C. Class A labs are allowed up to 10 gallons (38L) of Class I flammable liquid per 100 square feet or 20 gallons (76L) total of Class I, II, and III flammable and combustible liquid combined. These quantities can be doubled to 20 gallons of Class I liquid and 40 gallons (150L) of Class I, II, and III liquids, combined with the use of safety cans or storage cabinets.

NFPA 45 also addresses the maximum capacities for different storage container types. For example, for Class IA flammable liquids, the largest allowed container is one pint (500ml) for glass, one gallon (4L) for metal and approved plastic or polyethylene, and 2.6 gallons (10L) for safety cans. Safely storing flammable and combustible liquids in laboratories or stockrooms is risky business. However, by paying attention to the hazard class of the material, the largest container size, and the total quantities, you can minimize that risk. In addition, here are some general guidelines for safe flammable and combustible storage:

√ Do substitute nonflammable materials whenever possible.

√ Do post the work area with appropriate signs, e.g., "No Smoking" and "No Open Flames."

√ Do store flammable liquids in approved storage cabinets, explosion-proof refrigerators, and safety cans.

√ Do clear the area of all ignition sources.

√ Do transfer flammable liquids with extreme caution.

X Do not store large, heavy containers of liquids on high shelves or in high cabinets. A good rule is to store them at shoulder-level or below.

X Do not store bottles on the floor unless they are in some type of secondary containment.

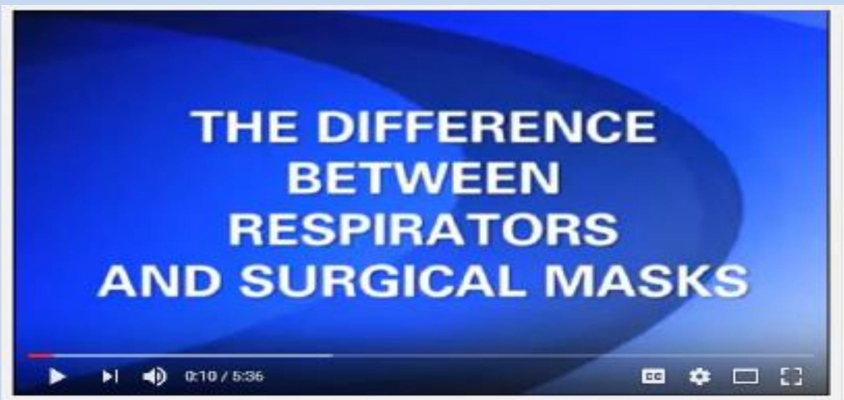
X Do not store flammable or combustible solvents near heat sources or in direct sunlight.

UNE Chemical Sharing Program

The UNE Chemical Sharing Program is a great way to reduce hazardous waste, reduce costs for your department, and have a positive environmental impact on campus. If you have any commonly used lab chemicals that you are thinking of disposing, please contact EHS so they can be listed in the next issues of EHS Lab Chatter as available for the UNE Chemical Sharing Program.

Chemicals currently available: None

Lab Safety Video of the Month:



https://www.youtube.com/watch?v=ovSLAuY8ib8

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