

## Environmental Health &amp; Safety

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**ENVIRONMENTAL HEALTH & SAFETY**

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**Safety Tips for Hot Plates** by John LaPerche

Recent incidents of fire involving laboratory hot plates, some caused by human error and some by equipment malfunction, serve as an important reminder for laboratory personnel to take some simple steps to minimize the potential for similar incidents from occurring.

Before use: Perform hot plate inspections regularly, and pay particular attention to the overall condition of the hot plate:

- ◆ Is the power cord in good condition?
- ◆ Is it kinked or wedged between sharp objects?
- ◆ Has it been exposed to any harsh chemicals?
- ◆ Has the power cord been burned from being in contact with the hot plate?
- ◆ Check the surrounding area to make sure there are no combustible materials in the area or any flammable liquids or gases that may ignite.



Test hot plates periodically to make sure all components and features are properly working. If one function is not working, consider replacing the whole unit; it may be a matter of time before some other part also fails. In fact, consider implementing a policy for your laboratory regarding scheduled equipment replacement of all equipment, as opposed to waiting until equipment breaks or catches fire.

Make sure all knob and switch indicators are properly labeled and in the correct location corresponding with the right setting (i.e., the “off” line on the knob lines up correctly with “off” setting on base). If a label is missing, create a replacement label indicating its function such as “Heat” or “Stir”. All hot plates are different, so be aware that many knobs and functions are different from unit to unit.

When purchasing a hot plate value is not always the best option. Consider safety features such as indicator lights, timer controls, signaling devices and surge protection when making equipment purchase choices. After purchase, always register your hot plate, as well as any other purchased equipment, with the manufacturer. If there is a recall for an equipment defect, you will be notified.

When using your hot plate:

- ◆ Make sure the hot plate is operating correctly; if defective, discard to prevent reuse.
- ◆ Set the timer. If the unit doesn’t have a timer or you are performing an “unattended” operation, consider using the timer function on your cell phone as an alarm.
- ◆ Always observe the Policy for Unattended Operation of Laboratory Equipment at <http://www.ehs.columbia.edu/LabUnattendedLabWork.html>.
- ◆ Remember to check your hot plate operation periodically to ensure it is running safely and there is enough liquid solution to avoid a “boil down”.
- ◆ Pull the plug if the hot plate overheats or cannot be shut off. If a “boil over” has occurred, make sure to clean the hot plate after the unit has cooled.
- ◆ Know the location of circuit breakers that control the hot plate and other equipment in your laboratory.



## The ABCs of Fire Extinguishers by Harry J. Oster

EH&S HAS  
REDESIGNED THE  
WEBSITE OFFERING  
NEW FEATURES AND  
ENHANCED  
NAVIGATION.  
[HTTP://  
EHS.COLUMBIA.EDU](http://ehs.columbia.edu)

To effectively and safely extinguish a fire, one should always use the correct type of fire extinguisher. In Columbia University laboratories, the two most common types of fire extinguishers provided are ABC (Fig. 2) or BC (Fig. 3).

Fire extinguishers are identified by letter classification (Fig. 1), as follows:

A= Combustibles, B= Flammable Liquids, C=Electrical, D= Combustible Metals, K= Cooking.

Extinguishers with combinations of these identifiers are suitable for all of the corresponding types of fires.

Figure 1



Figure 2



Figure 3

NO  
EATING  
DRINKING OR  
APPLYING COSMETICS  
WHEN WORKING  
IN THE  
LABORATORY

To use any fire extinguisher, remember the acronym “PASS” (Pull, Aim, Squeeze and Sweep); these instructions are often also located on the extinguisher decal. More importantly, when using an extinguisher, remember to keep your back towards the exit; in the event the fire is not controlled, you can safely leave the area. Stand initially about 4 to 6 feet away from the fire to discharge the extinguisher; as the flames diminish, you can then safely approach to completely extinguish the fire. Remember, a typical ABC extinguisher will provide less than 30 seconds of firefighting capacity. If you cannot extinguish a fire with a single ABC extinguisher, follow the “RACE” procedure: Rescue anyone in need, Alarm; pull the fire alarm, Confine the fire by closing doors as you leave, and Evacuate. Once you’ve reached a safe location, contact Public Safety with relevant information about the fire.

For Lab Fire Safety  
Prevention tips,  
check out:

FDN(wh)Y Me @

<http://>

[www.ehs.columbia.edu  
/FDNYMe.html](http://www.ehs.columbia.edu/FDNYMe.html)

## Academic Machine Shop Safety Update by Jim Kaznosky

EH&S has been working closely with *shop supervisors* from various academic departments to reinforce University-wide machine shop safety practices. The Academic Shop Safety Work Group, established to complete this task, has developed a broad policy that requires machine shop users to follow basic safety rules, and to complete both general shop safety and machine-specific trainings prior to using any equipment. Shop supervisors are implementing this program and ensuring that each user is provided appropriate training. Access to an academic shop will not be permitted without completion of the necessary training, or if it is found that a user has violated safety rules.

For further information and to specifically review the revised policy, visit the Shop Safety web page at <http://ehs.columbia.edu/ShopSafety.html>

On-line  
[Chemical Waste Pick-up  
Request](#) Form.

[http://  
vesta.cumc.columbia.edu/  
ehs/wastepickup](http://vesta.cumc.columbia.edu/ehs/wastepickup)

## Next Steps in GHS by Rob Velez

Now that the December 1, 2013 training deadline for the integration of the Globally Harmonized System for Classification and Labeling of Chemicals (GHS) with OSHA's Hazard Communication standard has passed and nearly 4,000 laboratory personnel have been successfully trained in accordance with OSHA's revised standard, it is time to focus attention on implementation.

You will recall from your GHS training that all chemicals in the laboratory must be properly labeled. Already, chemical manufacturer's labels are increasingly featuring GHS pictograms and hazard statements on new chemical containers. However, at this time your laboratory's existing chemical containers are not required to reflect the new GHS labeling standard provided they have retained their original label and are readily legible.

New and existing secondary or process containers (e.g., squeeze bottles, spray bottles, flasks, bottles, tubes, etc.) should be labeled with information consistent with GHS requirements, to ensure the safety of all laboratory personnel and emergency responders. Laboratory personnel should review the laboratory's chemical inventory, as well as secondary and process containers, to verify that labeling is consistent with GHS requirements.

Columbia University's subscription to *Chemwatch*, which is accessible to University personnel with a computer on the Columbia network, contains tens of thousands of GHS compliant Safety Data Sheets and can generate GHS compliant container labels for use in the laboratory. *Chemwatch* can create custom GHS labels for hazardous chemical mixtures. To view the GHS label generator tutorial visit <http://jr.chemwatch.net/7u89i8uyjh7uyj/>. To access *Chemwatch*, go to the EH&S home page ([www.ehs.columbia.edu](http://www.ehs.columbia.edu)) and select "Safety Data Sheet (SDS)," under "Emergency Response" (bottom left). On the Safety Data Sheets page, select "Safety Data Sheet (SDS) online search." This will take you to the *Chemwatch* (Gold FFX) page.

To create a label using *Chemwatch*...

1. Select "Materials" at the top left.
2. Select "Labels" in the "(M)SDS and Labels" section below the search window.
3. Type in the name of your chemical in the "Search Panel" and select "Full" to the left of the search button, then click "Search".
4. Click on the chemical you want from the search results.
5. Select a GHS label template when prompted and click "OK." Note, there are several GHS label formats available, even conical labels for flasks, so choose the one that best suits your labeling needs.
6. Load your printer with the appropriate label paper (e.g. *Avery* adhesive labels).
7. Click "Print" from the toolbar on the top right, then select the printer icon, locate your printer and *voila*.

Finally, please keep in mind the following note about shipping of chemicals. Under the GHS standard, any hazardous chemicals that a laboratory ships, whether to a collaborator on another Columbia campus or at another institution, to an off-campus field research location or an off-site, permitted storage facility, must be labeled in accordance with GHS since the shipper would be considered a manufacturer or distributor in such cases. In addition, USDOT and/or IATA rules would apply for packaging requirements and package markings. While this can be confusing, EH&S is available to assist your laboratory in meeting these regulations to ensure a safe and compliant shipment. See <http://ehs.columbia.edu/ShippingHazMaterials.html> for hazardous materials shipping information.



## Minimizing Chemical Exposures in Laboratories: A Hierarchy of Controls

by Yuseph Sleem

The term “Hierarchy of Controls” refers to a system used in the field of occupational safety to prevent or minimize exposure to harmful materials that may be used in the work environment. Under this system, several levels of control are used to prevent adverse exposure. These controls are ranked based on their level of effectiveness; the most effective controls should always be used as the primary means of protecting personnel from exposures whenever feasible, before utilizing any less effective options. The hierarchy is applied in the laboratory as follows:

**Elimination:** Eliminate the hazard from the workplace completely, if at all possible.

**Substitution:** Evaluate alternatives for replacing any hazard or chemical with a substitute that is less hazardous.

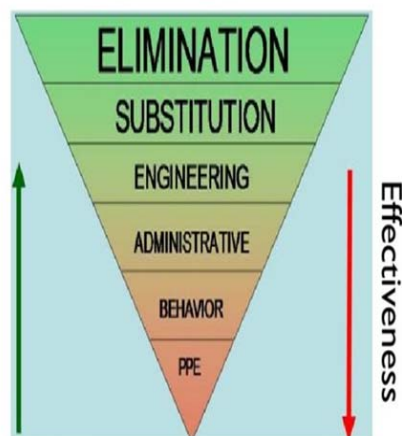
**Engineering Controls:** Enclose or isolate the hazard, for example, by using hazardous materials inside a chemical fume hood or infectious materials inside of a biosafety cabinet, rather than on the open bench top.

**Administrative Controls:** Establish policies and procedures to minimize risk, for example, reducing the duration of activities to limit exposure, posting hazard signs, restricting access, training workers, and developing written standard operating procedures.

**Behavior:** Follow safe work practices good workplace housekeeping, and personal hygiene practices.

**PPE:** Wear Personal Protective Equipment (PPE) to provide a barrier between the wearer and the hazard. PPE items include a lab coat, safety goggle, hearing protector, gloves, face shield, and footwear.

### Hierarchy of Controls



In laboratory settings, personnel should be aware of how to implement the hierarchy of controls to reduce exposure to hazards in their work environment. Personnel should identify highly toxic materials that are in use, evaluate the possibility of eliminating the use of these materials, or substitute such materials for less toxic alternatives. If these options are not feasible, the next best option is to ensure personnel are sufficiently protected by isolation of the hazard through effective engineering controls (e.g. glove box, fume hood, down draft hood, ventilated enclosure, etc.), and to employ administrative strategies to limit exposure. PPE should never be used as a first line of defense in preventing exposure to harmful materials. A laboratory researcher, for example, should not, as a first resort, choose to use a respirator (filtering face mask) to protect themselves from inhalation of harmful materials. By using a respirator, the wearer is not controlling the hazard at the source, but creating only a barrier between themselves and the contaminated environment, which is far less effective.

EH&S is available to assist laboratories in performing a risk assessment, inclusive of a chemical exposure assessment, to help determine how best to implement the hierarchy of controls. The Occupational Safety and Health Administration (OSHA) require that an exposure assessment be performed for specific hazardous chemicals, while it is simply best practice for other hazardous chemicals. For a comprehensive list of OSHA regulated substances and links to the relevant standards, please visit <http://ehs.columbia.edu/OSHASubstanceSpecificStandard.html>.

If you have concerns about the potential for exposure to a hazardous substance in your work environment, please contact EH&S to request an assessment by completing and submitting the Laboratory Hazard Assessment Form at <http://ehs.columbia.edu/LaboratoryHazardAssessmentForm.pdf>.

## Think before you reach for the bleach by Christopher Aston

The sodium hypochlorite in household bleach is a strong oxidizing agent and an effective disinfectant for known, and potentially, infectious materials used in research. However, over time, the sodium hypochlorite breaks down to salt and water, thus limiting its effectiveness. By keeping in mind a few important considerations, laboratories can ensure that their bleach provides a sufficient level of potency, when needed.

When bleach and water are mixed together, 1:10, to create a cleaning or disinfecting solution, the solution rapidly begins to lose needed disinfecting properties. Therefore, it is recommended that the solution be made fresh daily. Pre-filled spray bottles that mix at the nozzle are a convenient way of generating a 1:10 mixture for use in the lab. Storage arrangements and shelf-life are also important considerations when utilizing bleach solutions for cleaning and disinfection. Stock bleach should be stored in an opaque plastic bottle at room temperature. The rate of degradation depends on the initial hypochlorite concentration, ambient temperature and the volume remaining in the bottle. Although many do, manufacturers are not required to put an expiration date on the bottle. A good practice therefore, is to mark the bottle with the received date, and replace bleach that was received more than 6 months prior. Colorimetric test strips for hypochlorite concentration provide an easy and useful monitoring tool. As an additional measure of surety, it is possible to determine the production date of this product from the **last four digits** of the serial number on the bottle. The first of these digits identifies the year of production (3=2013, 4=2014) and the other three indicate the day of the year of production (002= Jan 2nd, 364=Dec 30th). For example, E63099 = production date April 9, 2013 (the 99<sup>th</sup> day of 2013). Initial hypochlorite concentration is also an important determinant of degradation rate. The potency of commercial bleach is between 3.25 and 6.15% hypochlorite, depending on manufacturer. Some brands and specific product lines, such as Ultra Clorox™, contain higher concentrations.

Finally, remember that bleach can be corrosive to metal (and skin!). Bleach residue on non-porous surfaces should be wiped off with water or 70% ethanol. Bleach should not be used in conjunction with other household cleaning products that contain ammonia; the two can react to produce several hazardous byproducts, including chlorine gas. Contact [biosafety@columbia.edu](mailto:biosafety@columbia.edu) for consultation to any laboratory on disinfection products and procedures.

## Anatomy of a Laboratory Cleanout by Nicholas Craig

At certain times it may be necessary for a laboratory to conduct a cleanout of unwanted chemicals. Whether the cleanout is in advance of a laboratory move, closure, or simply some chemical inventory “spring cleaning,” EH&S is available to help facilitate a seamless and efficient project. There are 3 primary phases to a laboratory chemical cleanout:

Phase 1: The laboratory contacts EH&S to indicate that a chemical cleanout is needed. Upon notification, a Hazardous Materials Specialist (HMS) and [the lab’s assigned Research Safety Specialist \(RSS\)](#) will conduct a walkthrough of the space with a designated laboratory representative to assess the scope of the cleanout.

Phase 2: Chemicals identified for removal and disposal are visually marked or segregated by a laboratory’s designated laboratory representative using either stickers, labels, colored tape, or by segregating chemicals in designated bins or on a specific laboratory bench or fume hood where only those chemicals destined for disposal are gathered. This step is important to ensure that only unwanted chemicals are removed from the laboratory space. EH&S also suggests taking photos, and/or providing a written inventory of chemicals to be discarded, making the removal process more efficient.

Phase 3: Following chemical marking and/or segregation, EH&S performs a pre-disposal walkthrough with a designated laboratory representative to verify which chemicals are to be removed; EH&S will photo-document the full inventory of chemicals for disposal. The designated chemicals will then be removed from the laboratory. Subsequently, an EH&S HMS and RSS, will perform a final verification with the designated laboratory representative to ensure that all of the chemicals were successfully removed.



## Dosimeter DOs and DON'Ts by Radiation Safety

Columbia University has a commitment to maintain radiation doses ALARA – As Low As Reasonably Achievable. Personal dosimeters (radiation badges) are used by faculty, staff and students to gauge the level of radiation dose, if any, they may have accumulated. After being returned by the wearer, the badges are sent to a vendor for processing, and evaluated by the Radiation Safety Officer (RSO) to verify that doses are below regulatory limits and ALARA. This is the most important reason for returning all badges at the designated end of the wear period. Timely return is important to ensure appropriate action can be taken to reduce future exposure, if warranted.

The RSO must be notified in writing if your badge is lost, stolen, if you move into another department, or if you are planning to leave your job. The “Employee Changes/Cancellations Form” is located on our website at <http://ehs.columbia.edu/RadiationFormsMC.html>, and must be submitted in person or by email to [badges@columbia.edu](mailto:badges@columbia.edu). The badge will be deactivated, and an accurate, updated list of current badge users can be maintained. You should also return dosimeters that are old or outdated, even if they are for someone who is no longer with the institution.

When wearing dosimeters:

- ◆ Wear badges during procedures involving radioactivity or x-rays.
- ◆ Report lost badges & fill out a lost badge form.
- ◆ Indicate deletions on the packing list that is enclosed with the badges.
- ◆ Inform the Radiation Safety Program [badges@columbia.edu](mailto:badges@columbia.edu) of badge coordinator changes.

Do Not:

- ◆ Share or discard badges.
- ◆ Use your Columbia badge at another institution or wear a badge from elsewhere while at Columbia.
- ◆ Bring badges home – they are meant as an occupational monitor.

The most recent dosimetry reports are posted by the supervisor or badge coordinator in each department in an area where personnel can view their exposure levels. For further questions about your badges or personal dosimetry, please email [badges@columbia.edu](mailto:badges@columbia.edu) or call (212)305-0303.

### New Additions to EH&S

Please join us in welcoming Nicola Epps, Administrative Assistant and Daniela Nicoletti, Dosimetry Coordinator to the EH&S team this past Fall 2013.

### Columbia University EH&S has joined Twitter!



In our continuing effort to ensure the Columbia University Community has the most up to date information on all matters related to health and safety both within and outside of the organization, EH&S is happy to announce the launch of our official Department twitter account. Following us is easy: you can follow our account (@ColumbiaEHS) from Twitter or through the easy access link on our home page at [ehs.columbia.edu](http://ehs.columbia.edu).

### Vision Statement

*Environmental Health & Safety (EH&S) provides expert guidance and timely service to the University Community through our commitment to health and safety. Employing best practices and collaboration, and by building long term relationships, we promote a productive and safety conscious work environment.*

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