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Environmental Health & Safety

SafetyMatters

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Environmental Health & Safety

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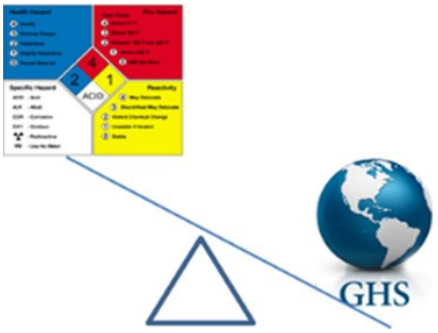
OSHA's Hazard Communication Standard (HCS) Transition to the Globally Harmonized System (GHS)

by O'Dane Wint, Associate Research Safety Specialist



For more than 30 years OSHA's Hazard Communication Standard (HCS) has served as the regulatory foundation of an employer's responsibilities to provide, and employee's rights to receive, information regarding the safe use of chemicals in the workplace. Under the original standard, chemical manufacturers and importers were given wide latitude to communicate information on labels and safety data sheets in an effective manner. This information is critical to a safe work environment, and the importance of this regulation cannot be discounted. Over time, however, a more standardized approach to conveying this information was developed in order to meet the needs of the global economy, and to ensure employees were universally able to understand the information provided.

In 2003, the United Nations (UN) adopted the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). As an active member of the UN, the United States agreed to align OSHA's HCS with the GHS format. GHS created a format that is both universal and more detailed in terms of chemical hazard information, providing a comprehensive system covering classification of health, physical and environmental hazards. It also included standardized labelling templates that are assigned to the different hazard categories, as well as pictograms, signal words and precautionary statement to highlight potential hazards to users. This has promoted a great deal of consistency and fosters an informed safety culture.

OSHA required that employees be trained on the new label elements (pictograms, hazard warnings, precautionary statements and signal words) and Safety Data Sheet layout by December 1, 2013. The requirement that distributors ship chemicals bearing GHS labelling was effective December 1, 2015. On June 1, 2016, employers are expected and required to update all alternative labelling and hazard communication programs that they previously had in place and make a complete transition to the GHS, as well as providing additional training for employees. Please contact a Research Safety Specialist at labsafety@columbia.edu with any questions related to chemical labeling.

EH&S website offers enhanced navigation http://ehs.columbia.edu

When working in the laboratory, eating, drinking or applying cosmetics is prohibited.

Proper work attire (long pants, closed toe shoes) and PPE (e.g., laboratory coat, gloves and eye protection) must be worn when working in the laboratory.

Remember to periodically flush your laboratory cup sinks and floor drains with water to help prevent odors from migrating into your laboratory.

On-line Chemical Waste Pick-up Request Form http://vesta.cumc.columbia.edu/

For Lab Fire Safety Prevention tips, check out FDN(wh)Y Me http://www.ehs.columbia.edu/FDNYMe.html

International Shipping of Biological Materials

by Christopher Aston, Manager, Biological Safety Programs

International collaborations are common at Columbia and frequently entail the export or import of biological research materials. The process can be complicated because, for customs purposes, the materials need to be described in detail and assigned a value using a commercial invoice document. Disease-causing agents require a CDC or USDA permit to enter the USA, and other countries have similar import controls. All shippers must first be trained and certified to ship biological materials or dry ice by completing RASCAL courses TC0507 and/or TC0076. In order to facilitate expedient passage of precious but perishable biologicals across the globe, EH&S can also provide pre-shipping consults to ensure that the materials are classified correctly, all applicable paperwork is completed, the material is packaged and labeled appropriately and sufficient dry ice is included to pre-empt unforeseen delays in customs or transit.

When preparing an international export, the single most important piece of advice is to plan ahead! Advance planning will help ensure selection of a courier that can get the materials where they need to go, that customs broker services are available in the destination country and that any applicable import permits are obtained.

EH&S guidance is available by emailing hazshipping@columbia.edu or completing an intent to ship form @ https://cumc.co1.qualtrics.com/jfe/form/SV_6nBRivDZ3CfTt6B.

The EH&S Biological Materials shipping manual is also a valuable resource @ http://ehs.columbia.edu/BiologicalMaterialsShippingManual.pdf.

Open Flame Operations

by Harry J. Oster CFPS, CFI, Senior Fire Safety Officer

Effective January 1, 2016 the New York City Fire Department (FDNY), revised certain sections of a fire code document known as NFPA 45, the "Standard on Fire Protection for Laboratories Using Chemicals." Several of these revisions mark important changes to laboratory operations, including those governing the use of open flames. Please take note to ensure your practices are in compliance with the new code.

Section 12.1.8.1 of NFPA 45 as revised by the modification, now reads as follows - Laboratory operations using open flames shall be performed in accordance with the following requirements:

1) Whenever possible, alternative methods to the use of open flames, such as heating mantels, hot plates, glass bead sterilizers, or infrared loop sterilizers, shall be used.
2) Hoses/tubing connecting a gas supply to a torch or Bunsen burner shall be in good condition, compatible with the gas being used and rated at least 150 percent of working pressure. Hose/tubing connections shall be gas-tight at the gas supply and torch/burner. Prior to each use, all connections shall be verified for tightness.
3) Open flame equipment with a small gas container attached shall be handheld, clamped, or weighted to prevent equipment from falling over.
4) If open flame operations are performed outside a hood, operations shall not be conducted under shelves, cabinets, or other overhanging equipment.
5) Combustible materials shall be kept at least 0.610 m (2 ft.) away from the open flame.

If you have any questions about these requirements, please email EH&S Fire Safety at fire-life@columbia.edu.

Magnet S-S-S-afety

by Max Amurao, Radiation Safety Officer - Clinical Applications

Have you ever had an MRI scan? Have you worked close to an NMR? Perhaps a strong permanent magnet? If you have, what do you remember about the experience? Did you feel anything unusual while you were immersed in the strong magnetic field? Chances are, you didn't feel, see, smell, or taste the "force" ... the magnetic force, that is!

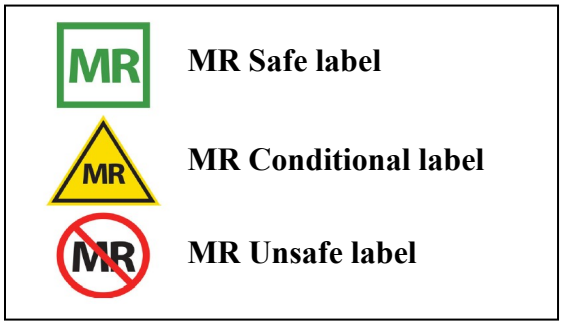
So if magnetic force cannot be experienced by our senses, it must be safe right? Well, it certainly can be, with the right knowledge and precautions.

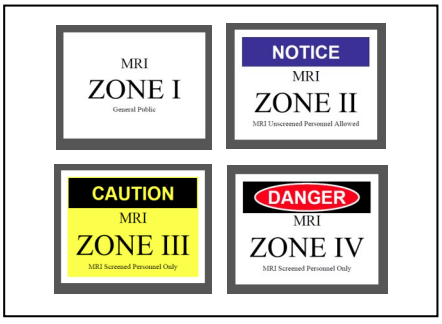
Strong magnets have the potential to cause serious injury if an object that becomes a projectile due to magnetic forces strikes a person. Maybe you're skeptical and thinking, "what 'everyday' object could that be? I don't have any of those in my laboratory." Think again; there are actually many "everyday" objects in a laboratory that would easily be attracted by strong magnets. These include regular office chairs, laboratory equipment, work tools, gas cylinders or tanks, and even office keys, among many others.

In addition to these hazards, electronic devices - smartphones, tablets, and laptops - can malfunction when exposed to a strong magnetic field. Magnetic devices, such as credit cards, hard drives, and USB memory sticks, can be irreparably damaged when exposed to a strong magnetic field, too! Or maybe you have an electronic medical implant like a pacemaker or deep brain stimulator? Perhaps a ferromagnetic implant, like an older-model aneurysm clip or hip implant; or a wearable medical device, like a hearing aid or insulin pump? In that case, you would certainly be able to tell that "the force is strong" when you are close to the NMR or MRI because these devices would interact with the magnetic field.

Since magnetic fields are undetectable to normal senses, how can personnel safely work with and around NMRs, MRIs, and strong magnets?
An easy mnemonic for basic magnet safety is SSS: **S** - IGNS & LABELS! **S** - AFETY ZONES! **S** - CREENING!

Signs and labels are especially important in magnet environments. Items, equipment, tools, and devices that are brought into the strong magnetic field environment must be labeled properly to ensure they can be safely used. One of three labels apply: MR Safe (Green box with green MR letters), MR Conditional (Yellow triangle with the letters MR), or MR Unsafe (Red circle with a diagonal bar and the letters MR). Examples of these signs are pictured below.





The international standards and testing organization ASTM International defines items which are MR Safe, MR Conditional, or MR Unsafe as follows:

- MR Safe—an item that poses no known hazards resulting from exposure to any MR environment. MR Safe items are composed of materials that are electrically nonconductive, nonmetallic, and nonmagnetic.
- MR Conditional—an item with demonstrated safety in the MR environment within defined conditions. At a minimum, this includes the conditions of the static magnetic field, the switched gradient magnetic field and the radiofrequency fields. Additional conditions, including specific configurations of the item, may be required.
- MR Unsafe—an item which poses unacceptable risks to the patient, medical staff or other persons within the MR environment.

(See Page 4 to Continue)

(Continued from Page 3)

Magnet operators must also ensure that appropriate signs are on entrances to high magnetic fields areas to warn people that they are about to enter a special-precaution zone. Although signage design is not standardized (see above examples), Magnet Safety zones must be defined, properly posted, and appropriately enforced. According to the American College of Radiology, Zone designations are defined as follows:

- Zone IV: The enclosed area where the strong magnetic field is present. There is no physical barrier between the magnet and the rest of the zone. Zone IV, by definition, will always be located within Zone III as it is the strong magnet and its associated magnetic field which generates the existence of Zone III.
- Zone III: There is a physical barrier (a wall or a door) between the magnet and this zone. This area is the region in which free access by unscreened non-MR personnel or ferromagnetic objects or equipment can result in serious injury or death as a result of interactions between the individuals or equipment and the MR system's particular environment.
- Zone II: This area is the interface between the publicly accessible uncontrolled Zone I and the strictly controlled Zone III. It is in Zone II that the answers to MR screening questions are typically obtained.
- Zone I: The "outside world". This region includes all areas that are freely accessible to the general public. This area is typically outside the MR environment itself and is the area through which researchers, patients, health care personnel, and other employees of the MR site access the MR environment.

Any individual entering Zone III and Zone IV must first pass a Magnet-Safety screening process before being allowed access to these two zones. A magnet-safety trained individual can enter Zone III or Zone IV, but only after being appropriately screened himself/herself. Any non-magnet-safety-trained individual entering Zone III or Zone IV must first be screened, then actively supervised by a trained individual while in these two zones. Please contact EH&S for guidance on developing a magnet screening form. When working with strong magnetic fields, remember S-S-S for Magnet S-S-S-afety.

ChemTracker

By, Ahmed Fathalla, Associate Research Safety Specialist

Preparing a chemical inventory is a valuable laboratory safety management practice. However, development and maintenance of a comprehensive laboratory chemical inventory poses several challenges, particularly in the academic research setting. Since 2006, the Morningside campus has been using the software solution ChemTracker to overcome these challenges and to centralize this process.

ChemTracker is a web-based software platform designed by Stanford University for chemical inventory management and reporting. After its successful implementation and use at Stanford, other organizations showed interest in the software which led to the creation of the ChemTracker Consortium. The Consortium is a collaboration of universities and other not-for-profit organizations that use the ChemTracker application, Columbia University included. Membership allows for its use, as well as a voice in guiding future system enhancements to serve the needs of users.

Account holders (e.g., laboratory members) in ChemTracker are able to view their chemical inventory, access safety information, and search its reference database which is home to over 36,000 chemicals. The reference database links inventory items to their classifications, hazards, applicable regulations, and physical properties. ChemTracker is an easy way for laboratory researchers to have specific chemical information at their fingertips. In case of an emergency, this critical information is also readily available to first responders.

Each laboratory at the Morningside Campus has a ChemTracker account with their complete chemical inventory. Principal Investigators at the Medical Center campus also have the option to upload their electronic inventory to access the reference database of safety information by CAS number. For interested Principal Investigators or lab managers, email chemtracker@columbia.edu to have an account created. ChemTracker training is available from EH&S by request.

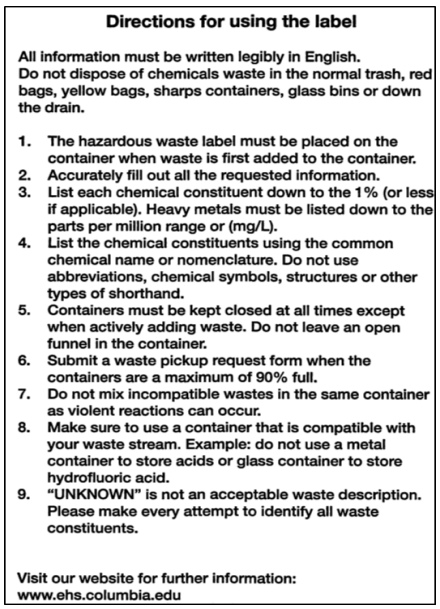
Isolating Potential Isoflurane Exposures

by James Kaznosky, Manager, Environmental and Occupational Safety Programs

Isoflurane is a halogenated hydrocarbon commonly used as an animal anesthetic. The National Institute for Occupational Safety and Health (NIOSH) recommends that personnel not be exposed to halogenated anesthetic gas concentrations in excess of two parts per million (2ppm) on average for any period longer than one hour. Researchers may experience exposure to isoflurane due to waste anesthetic gas escaping from induction boxes and from isoflurane gas escaping from nose cones or other delivery systems. Reducing exposure can be managed through the Hierarchy of Controls, which was discussed in the Winter 2015 edition of SafetyMatters ("Evaluating Chemical Exposures in Laboratories".)

EH&S conducted a series of laboratory assessments and developed equipment use and work practice recommendations to help eliminate or significantly reduce exposures to isoflurane below the NIOSH limit (see right). In general, engineering and administrative controls can greatly reduce your potential exposures to isoflurane. If you would like to arrange an EH&S survey of the isoflurane set-up in your laboratory, please contact the Occupational Safety Team at occusafety@columbia.edu.

- Manufacturer's recommendations should be followed for maintaining vaporizers. Typically, these should be calibrated at least annually.
- When filling isoflurane vaporizers, active engineering controls (e.g., a chemical fume hood or scavenging pump) are recommended. Additionally, a funnel or key may be used as an attachment to the isoflurane bottle when filling the vaporizer. These keys are available through ICM when an ICM-owned vaporizer is used.
- Slide-type induction boxes should be opened with opening of the box facing away from the user. Additionally, slide tops should be opened slowly to prevent isoflurane from rushing out.
- Minimize anesthetic gas leakage from the test subject's face mask by selecting the best fitting mask.
- If using passive scavenging systems, connect one charcoal canister to the test subject's face mask and another to induction chamber, if possible. The canister must be weighed prior to use and the weight must not exceed the maximum use weight. Charcoal filter maximum use weights vary by manufacturer and are typically stated on the canister.
- Hoses should be checked for gaps and leaks. Flush the system with oxygen and use a kimwipe to "visualize" escaping air at tube connections and fittings.
- Use the lowest concentration of isoflurane needed to properly anesthetize the test subject. This holds true for both induction boxes and nose cones. Turn the vaporizer delivery to the nose cone off when test subjects are removed from the nose cone.
- Active anesthetic gas scavenging methods, such as exhaust lines, should be positioned as close as possible to potential points of release (e.g., at test subject's face mask). House vacuum lines or non-ducted biological safety cabinets are not permitted to be used as engineering controls.
- The user's breathing zone should be at a maximal distance away from the test subject's face mask, as gas concentrations decrease rapidly with distance.
- Passive scavenging relies on the positive pressure from the anesthetic gas delivery system. As is the case with any filter cartridge, excessive flow through the filter can result in decreased performance, so gas flows should be set to the lowest rate that will allow adequate ventilation of the test subject and proper function of the vaporizer.



Directions for using the label

All information must be written legibly in English.
Do not dispose of chemicals waste in the normal trash, red bags, yellow bags, sharps containers, glass bins or down the drain.

1. The hazardous waste label must be placed on the container when waste is first added to the container.
2. Accurately fill out all the requested information.
3. List each chemical constituent down to the 1% (or less if applicable). Heavy metals must be listed down to the parts per million range or (mg/L).
4. List the chemical constituents using the common chemical name or nomenclature. Do not use abbreviations, chemical symbols, structures or other types of shorthand.
5. Containers must be kept closed at all times except when actively adding waste. Do not leave an open funnel in the container.
6. Submit a waste pickup request form when the containers are a maximum of 90% full.
7. Do not mix incompatible wastes in the same container as violent reactions can occur.
8. Make sure to use a container that is compatible with your waste stream. Example: do not use a metal container to store acids or glass container to store hydrofluoric acid.
9. "UNKNOWN" is not an acceptable waste description. Please make every attempt to identify all waste constituents.

Visit our website for further information:
www.ehs.columbia.edu

Trash or Treasure?

by, Keith Bottum, Sr. Hazardous Materials Specialist
& Laboratory Sustainability Coordinator

The reverse side of the peel-and-stick chemical waste labels (shown left) that EH&S provides free of charge is a treasure trove of information regarding proper management of your chemical/hazardous waste. The next time you apply a label to your hazardous waste container take a moment to review the information on the back before tossing the sheet into the paper recycling bin. Just about everything you need to know to manage your chemical/hazardous waste safely and in compliance with applicable regulations is listed in the 9 brief notes.

For additional questions, the bottom of the sheet also provides the EH&S URL: www.ehs.columbia.edu. Chemical waste pickup can be requested at the following URL: http://vesta.cumc.columbia.edu/ehs/wastepickup/.

Spotlight on Safety – Personal Protective Equipment

by Corey Wintamute, Senior Research Safety Specialist

Personal Protective Equipment (PPE) and proper attire are essentials for safety in the laboratory. In this edition of Spotlight on Safety, EH&S recognizes Laboratory Manager, Norma Romero, and the researchers in Dr. Serge E. Przedborski's laboratory, for demonstrating their commitment to safety through their consistent use PPE and proper laboratory attire. The following is an interview with Norma about PPE and proper laboratory attire practices and expectations in the Przedborski laboratory:

Corey: What type of research does the Przedborski laboratory do?
Norma: We study neuron degeneration diseases such Amyotrophic Lateral Sclerosis (ALS), Spinal Muscular Atrophy (SMA), and Parkinson's. We mainly study cell death mechanisms and try to formulate methods to block certain pathways. We mainly do tissue culture, molecular biology and histology. We currently have 14 people in our laboratory.

Corey: While visiting your lab, I've observed that everyone is always using PPE and is wearing proper lab attire. What is your lab's policy on PPE and lab attire? How long have you had this policy?
Norma: We follow Columbia's PPE Policy and have the rule just to be safe. As the lab manager, I emphasize that everyone must work safely. If people are not properly attired, they are not allowed to enter into the lab, this includes visitors; the PI fully backs me on this policy. We have had this policy for 20 years, since I started in 1996.

Corey: How did the use of PPE and proper lab attire become a priority in the lab?
Norma: Since I started working in the lab, it has always been a rule for me. I have a medical technology degree and safety has always been a priority. It is also helpful when EH&S visits the lab and reminds everyone of the policy so they know it's not just coming from me.

Corey: During the warmer weather, do you ever find it challenging to get people to wear proper lab attire? If so, how do you get people to comply?
Norma: When the weather is getting warm, I send an email and remind people in our weekly lab meeting. I tell them "I know that it is warm, but I am not going to let you work in the lab if you are wearing shorts or sandals." New people will sometimes come in shorts or sandals. I tell them that they must bring a change of clothes or shoes.

Corey: What happens if someone is non-compliant with your policy?
Norma: They are not allowed in the room. Even people that come from other labs. They sometimes come by not wearing proper clothes, I tell them that they must bring a change of clothes even though their PI does not have this policy.

Corey: What type advice would you give to other lab managers that struggle with enforcing a PPE policy in the lab? What service do you use for lab coats?
Norma: Don't be lenient. Be observant. Be an example. You do what you want other people to do. I emphasize that it is for safety reasons. For Lab coat services we use Unitex. They come weekly. They are very reliable.

Thanks again to Norma, Dr. Przedborski, and the members of the Przedborski Laboratory. Their teamwork and lead-by-example approach are a successful model for us all. Keep up the great work and stay safe!

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