Volume 8 Issue 2 COLUMBIA UNIVERSITY EH&S Spring 2014

Environmental Health & Safety

SafetyMatters

Inside this issue:

Biological Materials Shipping Manual by Kevin McGhee

Shipping hazardous materials can be a confusing and time-consuming task, given the complexity and number of rules that must be strictly adhered to for a hazardous materials shipment to be considered properly and safely prepared for transport. EH&S is here to help. The recently launched Biological Materials Shipping Manual will serve as a valuable tool for streamlining the process for trained and certified laboratory personnel to ship biological materials. While this manual is not a substitute for hazardous materials shipping training and certification, which are required by regulation and University policy, it is designed to serve as a comprehensive guide to remind shippers of the correct classification of materials for shipment, as well as the selection and preparation of packaging materials, labels and markings, and completion of all necessary documentation. The manual will guide trained and certified shippers needing to transport exempt human and animal specimens, genetically modified organisms/microorganisms (GMO/GMMO), biological substances, category B (BSCB), excepted quantities of dangerous goods used as preservatives, and dry ice.

The new manual can be found @: http://ehs.columbia.edu/BiologicalMaterialsShippingManual.pdf.
Additional information about hazardous materials shipping can be found @: http://ehs.columbia.edu/ShippingHazMaterials.html.
Assistance may be requested by contacting hazshipping@columbia.edu.
Prior to preparing a shipment, training and certification must first be completed through the RASCAL Training Center at http://www.rascal.columbia.edu. See courses TC0076 (Shipping with Dry Ice, Exempt Specimens and Excepted Quantities of Dangerous Goods) and/or TC0507 (Shipping Biological (infectious and potentially infectious) Materials and Genetically Modified Microorganisms (GMMO)). Live training for groups may be arranged upon request.

Follow EH&S on Twitter

For the most up-to-date environmental, health and safety information, both from within and outside of Columbia University, follow EH&S on Twitter@ColumbiaEHS or through the easy access link on our homepage @ www.ehs.columbia.edu.

ENVIRONMENTAL HEALTH & SAFETY

HTTP://EHS.COLUMBIA.EDU

MEDICAL CENTER
601 W 168TH ST
SUITE 44, 53, 54, 56
PHONE: (212) 305-6780
EHS-SAFETY@COLUMBIA.EDU

MEDICAL CENTER RADIATION
PHONE: (212) 305–0303
RSOCUMC@COLUMBIA.EDU

MORNINGSIDE CAMPUS
419 W 119TH ST
NEW YORK, NY 10027
PHONE: (212) 854-8749
EHRS@COLUMBIA.EDU

FOLLOW EH&S ON https://twitter.com/ColumbiaEHS

Printed on Recycled Papers

Not All Labware Is Created Equal by Greg Kwolek

Four laboratory incidents caused by chemicals stored within incompatible containers were reported to EH&S in 2013, all of which resulted in inadvertent hazardous materials releases. The three material classes used most frequently in the manufacture of laboratory containers are glass, metal, and plastic. All are useful for chemical storage, under the right circumstances, but they cannot always be utilized interchangeably. Each material possesses different chemical resistance characteristics. If a container that is chemically incompatible with its contents is selected, the container can degrade to the point of failure, potentially resulting in a hazardous materials release and exposure. For this reason, selecting a container for chemical storage must be done with great care.

Most commonly found in laboratories, and preferred for most chemical storage applications, are clear borosilicate or amber glass containers that typically exhibit a high degree of chemical resistance and are a sound storage choice for most chemicals, with a few exceptions. Some chemicals are capable of etching the surface of glass, potentially weakening the structure of the container to the point of failure. For this reason, storing chemicals such as hydrofluoric acid and concentrated hydroxide solutions in glass containers should be avoided.

Plastic containers are made of many different polymers with varying degrees of chemical resistance. Chemicals can decrease the integrity of polymers by physical and chemical means. Similar solubility parameters or polarities often result in the incompatibility of a polymer and chemical. Therefore, a plastic container compatible with the chemical contents must be selected by evaluating materials that have suitable resistance properties. In two recent incidents a concentrated potassium hydroxide solution degraded a polyethylene terephthalate (PETG) container. In a third, a dichloromethane solution quickly dissolved a polystyrene (PS) container. All could have been avoided by more careful container selection.

Metal containers, commonly produced from aluminum and stainless steel fare well with organic solvents, but are susceptible to damage from many corrosive chemicals. In a recent incident a 20 liter steel drum was repurposed as a hazardous waste container. The drum was primarily used to collect organic solvents, but some acidic material was inadvertently added, causing the drum to corrode and leak. In general, metal containers must be used with caution, and EH&S discourages the repurposing of metal containers for hazardous waste collection.

So how can you select the best chemical storage container? Firstly, if you keep chemicals in the primary container in which they are shipped, you have the greatest chance of avoiding an accidental release due to incompatibility. However, if you must transfer chemicals to a secondary container, selecting a chemically compatible container is made easiest by referencing chemical resistance and compatibility guides published on container manufacturers' websites. Container manufacturers expose their products to a variety of chemicals under typical experimental conditions (e.g., at room and elevated temperatures) in order to observe changes in visual appearance, mass, and by applying tensile and impact stresses to the materials after exposure. Questions? Please don't hesitate to contact a Research Safety Specialist at labsafety@columbia.edu.

EH&S has a redesigned website offering new features and enhanced navigation http://ehs.columbia.edu

No eating, drinking or applying cosmetics when working in the Laboratory.

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

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

The ABCs of RMW by Christopher Aston

Red bags are designated for regulated medical waste (RMW). Most laboratory personnel understand that sharp objects that could puncture a red bag must be discarded into a sharps container, as opposed to a red bag. The somewhat narrow regulatory definition identifies RMW as cultures of infectious materials, human tissues/fluids and blood-saturated items; essentially materials that are handled at biosafety level-2 (BSL-2). Currently, Columbia University takes a broader approach in that waste contaminated with organisms that are handled at BSL-1 is also treated as RMW. To ensure the safety and comfort of Columbia Facilities workers who handle municipal (clear bag) waste, and to reduce confusion among laboratory personnel in segregating biomedical waste based on the agents that may be in it, all such waste is generally best managed as RMW. Furthermore, material that looks "medical" in nature (e.g., petri dishes of food for *Drosophila melanogaster*) is also currently handled as RMW.

Laboratory personnel must be judicious about what they put into RMW waste receptacles (i.e., red bags and sharps containers) since it is significantly more costly to dispose of RMW than municipal waste. Packaging materials (e.g., cardboard and Styrofoam, media bottles etc.) and paper towels for hand washing are not to be placed in RMW receptacles, but rather discarded as municipal waste (clear bag).

The University's RMW policy (http://ehs.columbia.edu/RMWpolicy.pdf) is a valuable resource for laboratory personnel and describes in detail how to appropriately dispose of these biomedical materials. For more information, contact biosafety@columbia.edu

Open the LATCH by Tasha Hightower

In 2013, EH&S launched the Laboratory Assessment Tool and Chemical Hygiene Plan (LATCH), an electronic tool created to assist laboratories in preparing a Chemical Hygiene Plan in accordance with OSHA's *Occupational exposure to hazardous chemicals in laboratories* standard (aka, the "Lab Standard").
The LATCH is a complement to the University's Chemical Hygiene Plan (http://www.ehs.columbia.edu/Policy1.1.html) and is designed to identify the hazards that may be encountered within each laboratory and the appropriate control measures to prevent exposures. During 2012-13 laboratory safety surveys, the EH&S Research Safety Team worked with laboratories to complete the LATCH.

- For those in the research community who may be unfamiliar with the LATCH, please speak to your PI and/or Lab Manager.
- For PIs and/or Lab Managers whose laboratory has not yet prepared a LATCH, please visit http://www.ehs.columbia.edu/LabChemicalHygienePlanAndLATCH.html for detailed instructions on how to complete a LATCH for your laboratory, or contact a Research Safety Specialist at labsafety@columbia.edu
- If you are a PI new to Columbia University, please complete the "New Principal Investigator Questionnaire" (http://www.ehs.columbia.edu/NewPIQuestionnaire.pdf) or contact a Research Safety Specialist to request an introductory meeting to help set up your lab and assistance with developing your LATCH.
- For all PIs and laboratories that have successfully completed a LATCH (thank you!), please review and update your LATCH at least annually and when activities in your laboratory change. Such changes include, but are not limited to, personnel changes and the introduction of a new chemical or process. Please visit http://www.ehs.columbia.edu/LabChemicalHygienePlanAndLATCH.html for details on how to update your current LATCH.

Providing a safe and compliant work environment is everyone's responsibility. EH&S supports the University's safety culture through the development of guidance documents and tools for the research community to simplify and streamline the myriad safety and environmental requirements established by various government regulations, as well as accreditation and grant funding entities.

Prepare to Recycle by Daniel Condon

Glass, metal and plastic recycling is integral to sustainable environmental practices. Columbia University laboratories can make a significant contribution by incorporating empty laboratory glassware and reagent container recycling into their waste management program. Only empty and uncontaminated glassware and containers are suitable for recycling, however. To be considered empty, glassware and containers must meet the EPA definition of empty (aka "RCRA empty"). This means that conventional methods of emptying (e.g., pouring, pumping, scooping, spooning, etc.) must be utilized to completely remove contents from the container before taking the next step, which is rinsing the empty glassware or container prior to recycling.

There are a few very important exceptions to rinsing empty containers that must be strictly followed, as noted below under "Exceptions to Rinsing." If all conditions and exceptions have been met, the empty glassware or container should be rinsed with tap water according to the Rinsing Instructions below. Once dry and free from odor, the container can be recycled.

Rinsing Instructions:

- "RCRA empty" glassware and containers should be filled with tap water. Containers larger than 1L, should be filled with approximately 1L of water or a sufficient volume for adequate rinsing.
- Rinsate from RCRA empty containers may be discharged to a laboratory sink.
- After rinsing, leave the clean, open container in a fume hood to dry and allow any residual odor to dissipate.
- Containers can then either be:
  - Defaced to remove or obscure the manufacturer's label, recapped and repurposed as a chemical waste collection container with the addition of a Columbia University Hazardous Waste label (be certain to ensure container and chemical compatibility) ; or
  - Defaced, recapped and recycled through Facilities

Exceptions to Rinsing: Glassware and containers that previously held the following materials MUST NOT be rinsed. Instead, the entire container, with residue, must be managed as hazardous waste in accordance with Columbia University's "5Ls of Hazardous Waste Management":

- EPA acutely toxic P-listed waste. For reference, please refer to the "P-listed waste codes" available at http://www.dec.ny.gov/regs/14898.html. Note, at Morningside, containers with P-listed materials are marked with a pink sticker through the *ChemTracker* program.
- Pyrophoric materials;
- Water reactive materials; and
- All compressed gas cylinders and Aldrich Sure/Pac cylinders;

Examples of pyrophoric and water reactive materials include:

- Aluminum alkyl compounds, borane in THF, carbides, hydrides, lithium alkyl compounds, lithium aluminum hydride, metal powders, Periodic Table Group I Metals, organometallics, sodium borohydride, and -yl chlorides.

For more information, please contact a Hazardous Materials Specialist at hazmat@columbia.edu

Laboratory Chemical Inventory Audit started

As part of a quality assurance for chemical tracking in the Morningside laboratories, the *ChemTracker* audit has begun. Please be sure to discard empty chemical containers in the yellow bins (hallways) so that the bottles can be scanned out.

Please also show all your chemical bottles to the auditor so that they can be scanned. In the past, the primary discrepancy is that discarded containers were not scanned out which resulted in an inaccurate chemical inventory.

Clear the Clutter by Harry J. Oster

Happy Spring! With the coldest days of Winter behind us (we hope!), the beginning of Spring offers a terrific opportunity to "Clear the Clutter" from your laboratory and neighboring corridors. Doing so will help ensure these areas are safe and code-compliant.

The New York City Fire Code addresses clutter and storage issues in several ways, including:

Storage in buildings - Storage of combustible materials in buildings shall be orderly. Storage areas shall be separated from heaters or heating devices by distance or shielding so that ignition cannot occur.

Ceiling clearance - Storage shall be maintained 2 feet (610 mm) or more below the ceiling in areas of buildings not protected by a sprinkler system, or a minimum of 18 inches (457 mm) below sprinkler head deflectors in areas protected by a sprinkler system. Figure 1. illustrates a violation of this requirement; the cardboard boxes do not allow the required 18" of clearance below the sprinkler head.

Fig.1

Means of egress - Combustible materials shall not be stored in a manner that obstructs egress from any building, structure or premises. The New York City Building Code also informs us that the minimum corridor width shall not be less than 44 inches, except in a room, such as a laboratory, with an occupant capacity of 50 persons or less, where 36 inch clearance is allowed. Figure 2. illustrates a violation of this requirement.

Fig. 2

In closing, Spring is a great time to take a fresh look within our laboratories, neighboring corridors and storage areas to "Clear the Clutter."

For assistance in discarding clutter items, contact Facilities Management. For consultation about laboratory fire safety concerns, contact fire-life@columbia.edu.

Chemical Fume Hood Safe Work Practices by Muhammad Akram

A chemical fume hood (CFH) is an invaluable laboratory engineering control. Often referred to as a "first line of defense" against exposure to hazardous materials, CFHs are designed to minimize or eliminate exposure to hazardous materials by directing gases and vapors away from the user's breathing zone and providing a physical barrier between the user and their processes. CFHs have limitations and are only as effective as those who use them are in following basic use principles. To provide the highest level of protection, CFH users must employ, at a minimum, the following work practices:

- **Avoid** placing your upper body in the fume hood except during initial setup of equipment and before any hazardous materials have been placed inside the hood.
- **Avoid** using the fume hood for permanent storage of equipment or materials.
- **Maintain** sash height at 12"when using the fume hood; never open the sash greater than 18"; a wide open sash lowers the face velocity and capture effectiveness of the hood, and removes the physical barrier provided by the sash.
- **Place** hazardous materials at least 6" inside the hood for proper containment of airborne chemical hazards.
- **Raise** large equipment items inside the hood 3" - 4" off of the work surface to prevent blocking the airflow through the baffles at the back of work surface .
- **Keep** the hood sash at the lowest level possible for greater safety and to conserve energy when not in use.
- **Do not remove** the hood sash or panels, except for initial experimental setup and before hazardous chemicals are placed in the hood.

continue to page 6

Choosing the Right Detector by Angela Ran Meng

If your laboratory uses radioactive material (RAM), it will be necessary to conduct periodic radiation surveys under various circumstances. Surveys can be used to detect RAM contamination, evaluate radiation levels, to evaluate concentrations or quantities of radioactive material, or locate and define other potential radiological hazards that may be present. Surveys are performed during and after use of RAM, for monthly documentation of work area cleanliness, upon receipt and prior to shipping of RAM, and when disposing of RAM waste. Since the human body cannot sense radiation, we must rely on proper use of various types of radiation detectors for these surveys.

Using the right type of radiation detector is similar to having the right prescription glasses: readings can be skewed or completely missed when a wrong detector is used. The choice of radiation detector depends on the purpose of the survey and the radioisotope of concern. Liquid scintillation counters (LSC) are commonly used to detect contamination from alpha, beta or gamma emitters, such as ^{3}H, ^{14}C, ^{18}F, ^{32}P, ^{33}P, ^{35}S, ^{51}Cr, ^{125}I or ^{131}I; however they require time for sample preparation and processing. If a quick reading of radiation exposure and estimated dose from gamma emitters and high energy beta emitters is needed, an ion chamber is the best survey meter choice. In the laboratory, sodium iodide (NaI) detectors and Geiger Müller (GM) detectors can be used to search for contamination; the NaI detector is particularly good for detection of low energy gamma emitters such as ^{55}Fe and ^{125}I, while a GM detector is better suited for medium- to high-energy beta and gamma emitters, such as ^{18}F, ^{22}Na, ^{57}Co, ^{32}P and ^{33}P. Neither a GM detector nor a NaI detector will detect ^{3}H, ^{14}C or ^{35}S efficiently; it is best to use a liquid scintillation counter for these isotopes.

A simple way to tell if your meter is right for the type of survey to be performed is to check the calibration sticker on the handheld detector. If the isotope of interest is listed there, your detector is calibrated to measure that isotope and can be used for your radiation survey. If the isotope is not listed you may still be able to use the detector for that isotope, if the purpose and isotope of the survey fit the properties of your detector. For more information see the Radiation Monitoring Equipment policy @ http://www.ehs.columbia.edu/RadiationMonitoringEquipment.pdf or contact rsostaffcumc@columbia.edu at the Medical Center, or rso-ehrs@columbia.edu at Morningside for more information.

Chemical Fume Hood Safe Work Practices continue from page 5

CFHs are certified annually and marked with a sticker noting the date of certification, face velocity measurement and height at which the CFH is certified for use. Any CFH that fails its annual certification due to its face velocity being outside of the acceptable 80-120 ft. per minute flow rate range, is taken out of service and posted with a restricted use notice by EH&S, until repaired by Facilities Management.

Note, ductless fume hoods do not provide the same level of protection as a traditional ducted fume hood and are not permitted for use at Columbia University, or by the New York City Fire Department.

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.

Editorial Staff: Kathleen Crowley, Chris Pettinato, Chris Pitoscia
Graphics, Design, Lay-out: Jean Lee
Please share questions or comments with us at newsfeedback@columbia.edu