Volume 10 Issue 1 COLUMBIA UNIVERSITY EH&S Winter 2016

Environmental Health & Safety

SafetyMatters

Inside this issue:

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

Columbia, the LION has Launched!

by Christopher Pitoscia, Manager, Research Safety Programs

Together with the help of the Columbia University research community, EH&S recently launched its new research safety database, the Columbia University Laboratory Information Online Network, aka the "LION." Following the receipt of extensive user feedback, EH&S has been working diligently with our vendor, SafetyStratus, to customize the LION to meet your needs and provide a database platform for the management of survey and inspection correspondence, personnel and training, laboratory spaces and equipment, and the Laboratory Assessment Tool and Chemical Hygiene Plan (LATCH).

A warm "Thank You" is especially in order for the group of laboratories who volunteered their time and effort to assist us, hands-on, with one of the final steps of the development process, a pilot survey to test the corrective actions and correspondence features of the system. Throughout October, over 50 laboratories were visited, nearly half of whom graciously provided testing and feedback on a voluntary basis; this LION could not have roared without you!

In particular, EH&S acknowledges the laboratories of Dr. Andrew Kung, Robert and Ellen Kapito Professor of Pediatrics; Asst. Professor Lars Dietrich; and Professor Edward Guo. The Kung, Dietrich and Guo labs were selected as prize winners in our LION pre-launch call for volunteers, and were rewarded with safety glasses and eyewear retainers for all lab members.

Looking good, Guo Lab!

With the LION now online, users have the ability to manage numerous functions for their laboratory.

- The annual OSHA mandate to review and update the LATCH can now be completed with a brief check of the laboratory's prior hazard selections and personal protective equipment requirements.
- Personnel and training requirements are readily visible on a single page, with the ability to add, remove and update staff rosters with a few clicks.
- Spaces, equipment and important assets are tracked in the system.
- The LION dramatically streamlines communication with EH&S when following up on survey observations and other action items. In-lab surveys, performed by EH&S, will now be completed via tablet devices, allowing for real-time reporting.

If you have not already logged into the LION at www.ehs.columbia.edu/LION, we strongly encourage you to do so and to become acquainted with its features. Tutorials are available at www.ehs.columbia.edu to assist with learning the basic functions, and classroom sessions are planned through the Fall and Winter. Finally, we fully expect that the LION will grow and features will be added over time to further enhance the system's utility and the user experience.

Thank you again for remaining our partners in safety.

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

Introducing the PubChem Laboratory Chemical Safety Summary (LCSS)

by Greg Kwolek, Associate Manager, Research Safety Programs

PubChem, an open chemistry database maintained by the National Center for Biotechnology Information, is a free resource for researchers seeking information about the biological activities of small molecules. This in itself might not be news, but the addition of chemical safety information for thousands of compounds definitely is. Earlier this year, PubChem introduced the Laboratory Chemical Safety Summary (LCSS), a collection of chemical safety information similar to a safety data sheet (SDS) aggregated from a variety of databases and information sources. The LCSS includes GHS hazard classifications, toxicity summaries, exposure symptoms, and much more. With the addition of the LCSS, PubChem brings together valuable research and safety information in the same online resource. EH&S recommends reviewing the LCSS as a complement to the full SDS, available through the University's SDS provider, ChemWatch.

Shared Laboratory Spaces: A Tragedy of the Commons

by Jessica Phippard, Research Safety Specialist

"Tragedy of the commons" is a phrase popularized in 1968 by Garrett Hardin which comes to mind when working in shared quarters, especially so in laboratory spaces. Although Hardin used the expression to describe the social and environmental issues faced by a growing population with scarce resources, the concept can be easily transposed to describe communal work environments.

Whether the shared resource is a laboratory space or a piece of equipment, we have all, no doubt, experienced the frustration of finding our workspace in a different condition than we had left it. Standards of cleanliness and safety culture vary from one individual to another, which can result in unsafe working conditions for which no one claims accountability. Cold rooms and dark rooms are especially prone to this phenomenon. Dark rooms are susceptible to flooding if not properly maintained, and cold rooms often become home to legacy chemicals, research materials and mold growth, if not actively managed. Remember that visiting student three years back? Perhaps she left behind a stock of chemicals and miscellaneous samples that the laboratory is hesitant to dispose of. It is not uncommon in an academic research setting for legacy research materials to accumulate for years until someone steps up to take responsibility for the space and the disposition of unclaimed materials.

The advancement of your research requires collaboration, but the tragedy of the commons can stymie your successes. Vigilant written and oral communication is key to improving the working and safety conditions in shared laboratory spaces – appropriate training, signs and labels, up-to-date contact information and responsibility delegations are essential. Speak out for the common good, and remember your partners in safety, EH&S. We are always at your disposal to take an objective look and recommend a course of action (and may even be able to lend you a hand executing the plan).

Evaluating Chemical Exposures in Laboratories

by James Kaznosky, Manager, Environmental & Occupational Safety Programs

In the Winter 2014 edition of *SafetyMatters*, an article titled "Minimizing Chemical Exposures in Laboratories: A Hierarchy of Controls" discussed control methods used to limit chemical exposure in the laboratory. Exposure controls range from completely eliminating hazardous materials or processes, to creating a physical barrier between a user and the material through the use of personal protective equipment. As a reminder, the Hierarchy of Controls lists these methods from most to least effective:

Elimination: Eliminate the hazard from the workplace completely, if at all possible. This is the most effective method of exposure control.
Substitution: Evaluate alternatives for replacing any hazard or chemical with one that is less hazardous.
Engineering Controls: Make changes to the process or equipment to reduce the hazard, or enclose or isolate the hazard, e.g. using hazardous materials inside a chemical fume hood rather than on the open bench top.
Administrative: Establish policies and procedures to minimize risks, minimize duration of activities to limit exposure, post hazard signs, restrict access, and attend training sessions.
Behavior: Follow safe work practices, ensure good workplace housekeeping, and personal hygiene practices.
PPE: Utilize Personal Protective Equipment, which provides a barrier between the wearer and the hazard. PPE items include respirators, safety goggles, hearing protectors, gloves, face shields, and sturdy footwear.

The hierarchy of controls can be applied to any chemical in use in a laboratory by using the following guidance:

1. Identify hazardous materials in use in the laboratory and evaluate the exposure potential to these chemicals. Safety Data Sheets are an excellent source of information to help make these evaluations.
2. Once the hazardous chemicals have been identified, consider the possibility of eliminating the use of these materials, or substitute such materials for less toxic alternatives. A good example would be the mercury thermometer exchange program discussed in the Winter 2015 *SafetyMatters* Newsletter.
3. Determine if the hazard can be isolated through effective engineering controls, such as a using a chemical fume hood.
4. Control the hazard by applying administrative or behavioral practices and by using good laboratory hygiene and periodic procedural review when utilizing these chemicals.
5. When using any hazardous chemical in laboratories, follow the University's PPE Policy (http://ehs.columbia.edu/ppe.html), even when working with good engineering controls. Specifically, lab coats, close-toed shoes, and appropriate skin protection must be worn. While PPE *should never be used as a first line of defense* in preventing exposure to harmful materials, it is strongly recommended that this minimum level of PPE be utilized in conjunction with other more effective controls. As a reminder, respirator use is subject to the University's Respiratory Protection Program http://ehs.columbia.edu/RespiratoryProtection.pdf

Once a chemical has been evaluated, it should be incorporated into the laboratory's LATCH and communicated to all laboratory members who may have potential exposure both directly and indirectly. EH&S can assist in helping laboratories perform this evaluation upon request.

If your laboratory requires assistance in performing an evaluation or is concerned about potential exposures to a specific material in your work environment, please request an assessment by EH&S by contacting the Occupational Safety Team at occusafety@columbia.edu.

Your Way Out

by Andrew J. Patterson, Associate Fire Safety Officer

In the event of an emergency, it is important that all personnel have a safe way out, also known as "a means of egress," from their work area. The New York City Fire Code sets forth a few compliance requirements to ensure means of egress are ready for use in the event of a fire or emergency in order to allow for an orderly exit to a safe location. Here are just a few:

1. All required means of egress, including each exit, exit access and exit discharge, shall be continuously maintained free from obstructions and impediments for immediate use in the event of fire or other emergency.
2. No exit door shall be blocked partially or entirely, even if there is more than one required door.
3. Within a corridor a 44 inch wide means of egress must be maintained and within a laboratory a 36 inch wide means of egress must be maintained.

A little good housekeeping goes a long way toward keeping you safe in the event of an emergency. Always ensure that means of egress are kept clear, clean and clutter-free.

The photo below is an example of a well maintained means of egress.

The photos above are showing examples of poorly maintained means of egress.

Regulated Medical Waste Disposal Guide

by Jessica Kuang, Associate Biological Safety Officer

Have you spotted new Regulated Medical Waste (RMW) signage going up around campus or even within your laboratory?

If so, look closely and you will notice that the new sign is an updated version of EH&S' previous Laboratory Disposal Guide, now focusing specifically on the best disposal practices for RMW. EH&S has been distributing the guide throughout the research community to promote awareness and educate staff on proper waste segregation. The guide is an easy visual reference to identify appropriate waste streams for sharps, liquid RMW, unfixed and fixed tissues, carcasses and infectious material that requires on-site autoclaving.

Should you need to view, or print a copy, the *Regulated Medical Waste Disposal Guide* is accessible on the EH&S website @ http://ehs.columbia.edu/LabRMWSign.pdf.

For further information on the policy, please visit http://ehs.columbia.edu/RMWpolicy.pdf

Spotlight on Safety – Green Chemistry comes to Nanocrystals

by Kathy Heinemann, Research Safety Specialist

Semiconductor nanocrystals, also known as quantum dots, have a growing demand in the manufacture of display screens and development of solar cells. By the phenomenon known as quantum confinement, where the electrons in these crystals can only occupy discrete energy levels, the emission and absorption wavelengths of each 'dot' can be tuned by changing their size. The advancement of this research therefore depends on the ability to control for the size of the crystals during synthesis.

In a recent paper published in *Science*, researchers in Professor Jon Owen's laboratory have demonstrated a highly tunable, air-stable, and more cost-effective way to synthesize semiconductor nanocrystals using a group of substituted thioureas, allowing for specific size-control ranging across multiple orders of magnitude. Previously, this synthesis involved working with bis(trimethylsilyl) sulfide, $(TMS)_2S$, and the sizes of the crystals could only be approximated with changes to the temperature and reaction length. In addition, there were more safety concerns. $(TMS)_2S$ is part of a larger class of compounds known as 'stench chemicals,' all of which are highly malodorous in low quantities, and chemically related to the additive in natural gas used to detect leaks. $(TMS)_2S$ has an extremely offensive smell in microgram quantities, and generates the asphyxiant hydrogen sulfide gas on contact with water. Thioureas, on the other hand, have no odor profile and are stable in air.

While the improved safety of the new thiourea approach to semiconductor nanocrystals is not as well-advertised, Michael Campos, a Columbia University graduate student and an author on the *Science* paper, considers this an important feature. He notes, "You could make an argument that this is an unusual achievement in the field of green chemistry, since many 'green' methods sacrifice some degree of quality or versatility in order to achieve environmental goals. Our paper improves on both fronts at the same time."

As with most exciting research, there are always safety considerations to be aware of. The replacement of a stench chemical with odor-free and air-stable thioureas is a marked reduction in the exposure risks with this research. Michael Campos reminds us, however, "a synthesis of heavy metal-containing materials can only be so 'green.' "

For researchers who still need to use thiols and other malodorous chemicals, enter 'stench chemicals' into the search bar on our website www.ehs.columbia.edu. There you will find a new standard operating procedure that supports a Schlenk technique for this research.

A Note about Bleach Disinfection and Chemical Compatibility

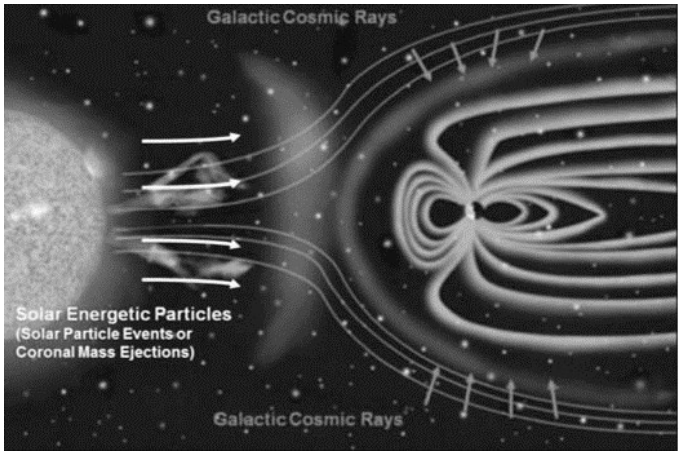
by Aderemi Dosunmu, Biological Safety Officer

When decontaminating liquid biohazard waste with bleach, be aware of chemicals that may also be in your waste container. Incompatibility is not generally a problem for tissue culture waste, but if you are decontaminating a culture solution where guanidine salts were utilized (for example in nucleic acid extraction kits), mixing with bleach can cause a release of toxic fumes, such as cyanide gas or a chlorinated vapor. How can a researcher best determine if a chemical solution from a kit could react with bleach? Always check the kit's Safety Data Sheet (SDS), which will provide extra information regarding its contents' chemical compatibility.

Cosmic Radiation: From Mars to Earth

by Angela Ran Meng, Senior Health Physicist

From the intense media coverage of the one-way manned trip proposed by Mars One, the recent blockbuster movie *The Martian*, and NASA's new evidence of the existence of liquid water on the "red planet," Mars has received a lot of attention of late. These messages, both real and fictional, remind us about just how much adversity a human would need to overcome in order to travel to and survive on a planet like Mars. One such challenge is exposure to cosmic radiation.



Cosmic radiation in our solar system is predominantly composed of a chronic low dose of galactic cosmic rays and sporadic short-term exposures from energetic solar particles. Galactic cosmic rays consist of high energy protons, helium nuclei and other high energy heavy ions; solar particles are primarily protons accelerated by solar flares and coronal mass ejections. Life on earth is protected from cosmic radiation by the Earth's thick atmosphere and strong magnetic fields. Since Earth's atmosphere is thinner at higher altitudes, frequent long distance flyers are exposed to more cosmic radiation than others; for example airline passengers receive an approximate 5 mrem dose during a single round trip flight from New York to Los Angeles.

Among all occupations, astronauts - including possible future interplanetary travelers - receive the highest cosmic radiation dose. The National Council of Radiation Protection advises a career exposure limit of up to 400,000 mrem for low Earth orbit activities. Apollo astronauts received doses averaging 120 mrem/day, compared to 0.086 mrem/day on Earth at sea level. NASA estimates that astronauts travelling in space to Mars could receive an average radiation dose of 180 mrem/day in space and 200 mrem/day on the surface of Mars. These high levels are due to the thin atmosphere on Mars - only 1% of Earth's atmosphere - and weak and patchy magnetic fields, mainly in the planet's southern hemisphere.

The message? Clearly, occupational safety considerations will not be left behind if (or when) humans solve the puzzle of travel to and survival on Mars!

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.

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