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Environmental Health & Safety

Safety Matters

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Hazardous Materials Appendix Changes Are Coming Spring 2019

If your research involves *in vivo* (or *in vitro*) use of hazardous chemicals, biological agents (including gene editing), controlled substances, lasers, and/or radiation, which requires the attachment of an Appendix to an IACUC or IRB protocol or for direct submission to EH&S, this message is for you.

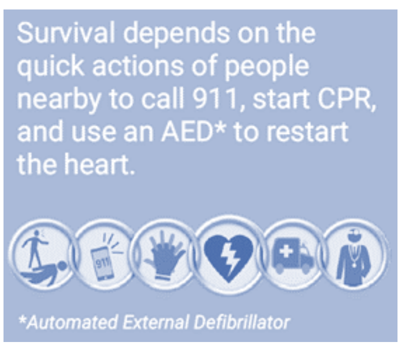
Later this spring, a number of exciting changes and improvements will be introduced to the Rascal HazMat module. As a result, copies of old appendices will **not** be available to attach to protocols due to formatting changes. When the new Appendices go live in Rascal **new** Appendices must be **created** to reflect hazardous materials work for all submissions or modifications, even if in the middle of a review process. The good news, is that going forward the entire Appendix creation and attachment process will be streamlined to make researcher's submission easier.

The anticipated changeover date is projected to be the end of April. EH&S will hold training sessions and consultations on how to navigate these changes. Stay Tuned.

For a preview of the improvements EH&S is making to the Appendix system, or other questions/concerns, please contact biosafety@columbia.edu.

CALL FOR VOLUNTEERS – CPR First Responder

by Geraldine Tan, Executive Director of Compliance, Facilities & Operations



Columbia University is pleased to announce the initiation of a university-wide Public Access Defibrillation (PAD) program in association with the Regional Emergency Medical Services Council of New York City (REMSCO). We are looking for volunteers from each Automated External Defibrillators (AED) equipped building to be trained in first aid, CPR, and AED use as a Columbia University "CPR first responder." Each training session is limited to **ten** attendees (due to American Heart Association student-to-instructor ratio requirements). Availability is based on a first-come, first-served basis.

Training Dates: Two 4-hour training sessions will be held each day.

Tuesday, March 19th:	Manhattanville Public Safety Operations Center
Wednesday, March 20th :	Morningside / TBD
Thursday, March 21st :	Medical Center / TBD

Interested personnel should contact aedprogram@columbia.edu to register for the training sessions. If you are already trained in CPR/First-aid, please send a copy of your credentials to aedprogram@columbia.edu to be included in the Columbia University CPR bystander registry.

Don't forget to check out the new AED website for up to date program information!
https://preparedness.columbia.edu/content/automated-external-defibrillator-aed

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

Proper work attire (e.g., 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 prevent odors from migrating into your laboratory.

For Lab Fire Safety Prevention tips, check out FDN(wh)Y Me https://research.columbia.edu/content/fdnwhy-me

Shining a Light on Darkroom Safety

by George Hercules, Safety Advisor

Since their inception in the early 19th century darkrooms have occupied a niche role in research laboratories. Although the presence of darkrooms in research spaces has decreased over the decades due to the introduction of digital photo processing, safety still remains as important as it was during their infancy. EH&S would like to recommend a few best practices when utilizing photo processing machines in darkrooms.

One common problem: Liquid Overflow. Today's photo processing machines are sophisticated: many can automatically detect the amount of fixer and developer and add water to the solution for correct mixture dilution. However, most machines cannot sense if the amount of water added will cause overflow. For this reason, it is important for users to exercise caution when refilling these machines and follow the manufacturers' instructions and/or the laboratory's Standard Operating Procedures.

Another best practice is keeping use logs in the darkroom. New York City law requires a log of all photo-processing work be maintained by the operator. All dark room users are responsible for completing the dark room log sheet when the photo-processor is used. The dark room log sheet is not only a regulatory requirement but is utilized by University vendors to ensure timely maintenance is performed on photo-processing and silver recovery units. Many darkrooms are shared among research groups. All users must be accountable for the safety, cleanliness and compliance in the space.

Below are a few additional important guidelines and tips for using darkrooms safely:

- Limit access to the darkroom.
- Log entry.
- Tightly close all containers when not in use to prevent toxic fumes from being released.
- Do not store chemical bottles directly on the floor. Always ensure chemicals are in secondary containment.
- Segregate incompatible chemicals; do not store acids close to reducers.
- Collect scrap film in a labeled container. Do not place into sharps containers, regulated medical waste (red bags) or regular trash.
- Have a spill kit available. Based on your knowledge, skills, abilities, and spill kit you may clean up a small spill (e.g., dinner-plate sized puddle). If spill seems unmanageable (e.g., more than a liter of hazardous chemicals) or when resources are unavailable to address the release, call EH&S at 212-305-6780.

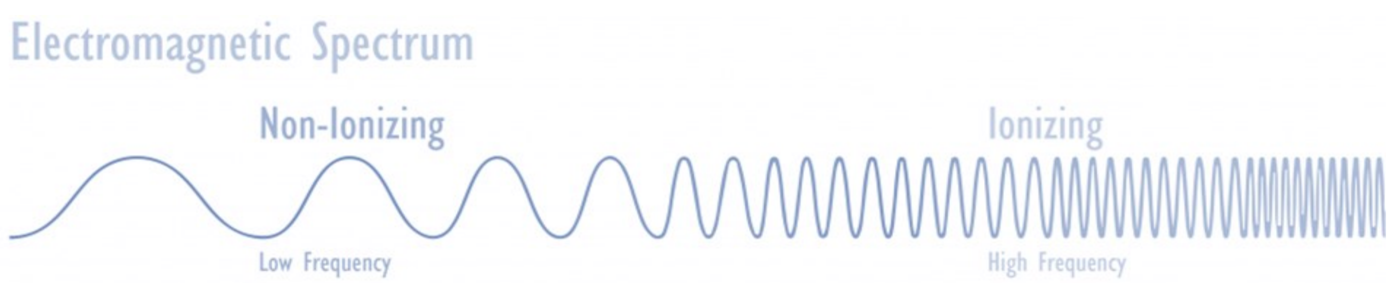
For more information on darkroom safety, silver recovery, and other additional resources, see our website https://research.columbia.edu/content/silver-recovery.

Radiation Education: The Differences Between Ionizing and Non-Ionizing

by Laszlo Virag, Senior Safety Analyst

In the most general sense, radiation is defined as emission and transmission of energy in the form of waves or particles. Waves can be electromagnetic, acoustic or gravitational in nature. For example, the visible and UV light, infrared, microwaves and radio waves as well as X-rays and gamma (ϒ) rays are all electromagnetic. Sound, ultrasound, and seismic waves are also considered forms of radiation. Alpha (α) radiation, beta (β) radiation, and neutron radiation are examples of energy emission/transmission in the form of particles. The energy carried by these waves or particles can vary greatly. Particles carry kinetic energy that depends on their mass and speed. The energy carried by waves is directly proportional with their frequency, and higher frequencies mean shorter wavelengths.

In the laboratory, radiation or radiation safety almost always refers to **ionizing** radiation. Ionizing radiation consists of waves and particles carrying enough energy to ionize atoms and molecules. Ionizing radiation is considered to be potentially harmful and sometimes even lethal to living organisms despite some beneficial uses, e.g., radiation therapy for cancer treatment. Examples of ionizing radiation include Gamma rays, X-rays, and the higher energy (shorter wavelength) domain of UV light. However, the transition between ionizing and non-ionizing electromagnetic radiation is not sharply defined because different atoms and molecules ionize at different energies. For example, the lowest ionization energy of any chemical element is Cesium's 3.89 electron-volts (eV). Yet the boundary between ionizing and non-ionizing radiation is considered to be between 10 eV and 33 eV, corresponding to wavelengths of 38 to 124 nanometers. These limits correspond, more or less, to the first ionization energy of Oxygen and Hydrogen (approximately 14 eV) and the ionization energy of the water molecule (H_2O) at 33 eV.



Non-ionizing radiation consists of radiation that cannot directly ionize materials. Examples include radio-waves, microwaves, visible light, and lower energy (longer wavelength) UV light. In the lab, the sources of non-ionizing radiation most commonly encountered are lasers, radiofrequency (RF) generators and a variety of UV light sources including germicidal lamps. Despite not causing ionization in matter, non-ionizing radiation can still have harmful effects on living organisms. Lasers can damage the retina of the eye; RF can cause induction heating burns; lower energy (longer wavelength) UV light can disrupt interatomic bonds in molecules, generating reactive species damaging to biological tissues, e.g., skin sunburns.

Radiation comes in many forms, and whether it is ionizing or non-ionizing, researchers should be aware of the hazards and take proper precautions in order to use it safely. If there are any questions or concerns about laboratory radiation use, contact rsocumc@columbia.edu.

Do the Right Thing, Wear the Right Glove

by Cody Cameron, Biological Safety Officer

There are three key ingredients to dressing for success in the research laboratory: body protection (e.g., lab coats), eye protection (e.g., safety glasses) and hand protection. Just as is the case for the body and eyes, researcher's hands confront unique hazards, and gloves must be worn when there is a potential for exposure to chemical, physical, or biological hazards.

Not all gloves are created equal and choosing the right glove can be a challenge. Researchers should always be aware of potential chemical incompatibility concerns with certain gloves. For example, some solvents such as acetone can degrade latex very rapidly. The table to the right lists several common chemicals used in research and the recommended glove. Most glove manufacturers publish similar tables, and confirming chemical compatibility with glove material should be standard practice for all researchers, especially when working with new chemicals or new gloves. For additional guidance please reach out to labsafety@columbia.edu.

Chemical	Glove Recommendation
Acetic Acid (Glacial)	Neoprene
Acetone	Neoprene
Acetonitrile	Laminate (Nitrile, Neoprene gloves are suitable for that application under careful control of its use as per the manufacture)
Benzene	PVA (POLYVINYL ALCOHOL)
Chloroform	PVA (POLYVINYL ALCOHOL)
Ether	Nitrile
Ethidium Bromide	Nitrile, Neoprene
Ethyl/Methyl Alcohol	Nitrile
Formaldehyde	Nitrile
Hexane	Nitrile, Neoprene
Hydrochloric Acid	Nitrile, Neoprene
Hydrofluoric Acid	Nitrile, Neoprene
Lactic Acid	Nitrile
Mercury	Nitrile
Methyl Methacrylate	Laminate, PVA (POLYVINYL ALCOHOL)
Methylene Chloride	PVA (POLYVINYL ALCOHOL)
Nitric Acid	Nitrile (10% solutions), Neoprene (70% solutions)
Phenol	PVC (POLYVINYL CHLORIDE), Neoprene
Phosphoric Acid	Nitrile, Neoprene
Perchloric Acid	Nitrile, Neoprene
Sulfuric acid	Laminate (Nitrile, Neoprene gloves are suitable for that application under careful control of its use as per the manufacture)
Toluene	PVA (POLYVINYL ALCOHOL)
Xylene	Laminate, Nitrile, PVA (POLYVINYL ALCOHOL)

Thermal Gloves must be used to handle physical hazards such as the extreme hot and cold temperatures of autoclaves and liquid nitrogen tanks. Many surfaces of an autoclave itself as well as the contents of a sterilized load, can become very hot, reaching temperatures upwards of 121°C. It is important to not handle items fresh out of the autoclave or oven; wait for cooling, then use heat-resistant autoclave gloves. On the opposite end of the temperature extreme, liquid nitrogen tanks, dry ice, or when working in cold rooms, use insulated gloves specifically designed for protection from the hazards of frostbite or cold burns.

Disposable gloves, whether latex or nitrile are both acceptable for infection control when utilizing biological materials. Many researchers prefer to use nitrile gloves exclusively, in order to avoid sensitization and latex allergies. Be mindful not to use gloves in hallways or elevators, since the gloves may be (or be perceived to be) contaminated with potentially infectious material. If necessary, to transport biological materials in public spaces, containerize them in a durable lidded transport container and carry with ungloved hands.

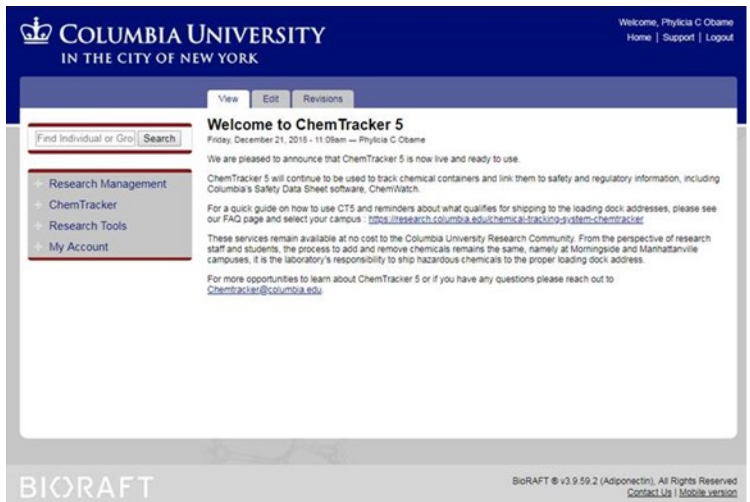
For additional information regarding lab coats, eye protection, and gloves, visit the EH&S general Personal Protective Equipment page - https://research.columbia.edu/content/personal-protective-equipment-ppe - including details on the use of manufacturer's glove guides, photos of proper donning and doffing of gloves, and best practices when in public areas. For more information reach out to labsafety@columbia.edu.

Welcome ChemTracker 5

by Phylicia Obame, Senior Systems Analyst

EH&S is pleased to announce that ChemTracker 4, our online chemical tracking software program was upgraded to ChemTracker 5 and received a brand new look on December 20th 2018.

In addition to the new layout and design, ChemTracker 5 has integrated with CUIT via Single-Sign On. Researchers can now log into ChemTracker 5 using their Columbia UNI and password. The ChemTracker guide is available on the EH&S website: https://research.columbia.edu/system/files/EHS/Lab%20Safety/BioRAFT_ChemTrackerPI-QuickStartGuide.pdf.



ChemTracker 5 will continue to be used to track chemical containers and link them to safety and regulatory information, including Columbia's Safety Data Sheet software, ChemWatch. These services remain available at no cost to the Columbia University Research Community.

At the Morningside and Manhattanville campuses, the process to add and remove chemicals remains the same: it is the laboratory's responsibility to order hazardous chemicals to the proper loading dock address where EH&S bar-coders will receive and upload the chemicals into ChemTracker. (See ChemTracker FAQ: https://research.columbia.edu/chemical-tracking-system-chemtracker). At Barnard and NYSPI, laboratories will receive chemicals directly and researchers are responsible for uploading the Information into ChemTracker. Irving Medical Center laboratories are encouraged to contact EH&S for information on how to use other available benefits of ChemTracker in the absence of a central receiving system: labsafety@columbia.edu.

For more opportunities to learn about ChemTracker 5 or to discuss any questions or concerns, please reach out to Chemtracker@columbia.edu.

Fire Safety Minute

Daylight Saving Time is March 10th 2019.

Don't forget to check your Smoke Detectors!

Spotlight on Safety — Enhancing Safety by Chemical Inventory Management

by Parinita Sah, Senior Safety Advisor

Dr. Matthias Quick is an Associate Professor of Neurobiology (in Psychiatry) in the Department of Psychiatry and in the Center for Molecular Recognition in the Columbia University Vagelos College of Physicians and Surgeons, and Research Scientist V in the New York State Psychiatric Institute (NYSPI) Division of Molecular Therapeutics. He also serves as the Director of Laboratory Safety at NYSPI/Research Foundation for Mental Hygiene (RFMH), where he is also the Right-to-Know Officer and Chemical Hygiene Officer. Dr. Quick has been a member of the Hazardous Waste Management - Laboratory Safety and EH&S Joint Committee since 2014 and has served as co-chair along with Dr. Mark Underwood since January 2016.

SafetyMatters: What was the motivation to develop a chemical inventory system for NYSPI Laboratories?
Dr. Quick: In 2013 my lab, along with two other labs, moved from the P&S and Black buildings to the shared lab space of the Division of Molecular Therapeutics in the NYSPI Kolb Research Annex. During the preparation of the move it became obvious that we needed an inventory system that allows tracking of the large chemical inventories from the three individual labs to prevent redundancy in ordering chemicals and to comply with reporting regulations. Even though we tested various electronic laboratory notebooks, their inventory modules were not useful in the academic laboratory setting. Through my interactions with EH&S, I became aware of ChemTracker; initial tests in our Division proved this chemical inventory software very useful and user-friendly. When I assumed the role as the Laboratory Safety Director I realized that ChemTracker would be the ideal tool to combine the existing chemical inventories (in simple tabular format) of all labs in the Kolb and Pardes buildings in a centralized online database. In combination with a RFID-based tagging system, ChemTracker would enable real-time assessment of all chemicals in the institute. Based on EH&S' experience with the RFID-based tagging of chemical containers, and our successful tests, we adopted this approach. In addition to mass-tag-scanning and RFID tag locator via a proximity scan feature, this system provides a unique opportunity to oversee the use of hazardous substances in Engineering/Facilities Management with the large number of chemicals in research labs. With the help of AECOM, a contractor for NYSPI, it was possible to perform a physical inventory of 10,712 chemicals and hazardous substances present in the Kolb and Pardes buildings.

SafetyMatters: What are some benefits an online inventory system?
Dr. Quick: There are plenty of benefits of the ChemTracker inventory system: having real-time information about the amount and the location of a particular chemical container, sharing infrequently used chemicals and/or redistribute surplus chemicals among researchers, monitoring expiration dates of time-sensitive chemicals, and cost-saving by ordering optimal amount of chemicals, thereby reducing redundancy. A recent great example of the usefulness of the ChemTracker was its use in conjunction with a recall from the National Recall Alert Center; a certain batch of a chemical was listed in a recall alert, and with the click of a button it was possible to identify and localize the affected chemical containers using ChemTracker and send it back to the manufacturer.

SafetyMatters: How has chemical inventory and ChemTracker been helpful in enhancing the safety culture of NYSPI Laboratories?
Dr. Quick: ChemTracker has been received extremely well by the researchers here at NYSPI. Everyone is fascinated by it and has shown a positive attitude about staying on top of their inventory. The time spent searching for a particular chemical container is now greatly reduced, and I anticipate that we will see significant cost savings in the near future due to increased sharing of available resources in individual labs and reduced redundancy in chemical ordering.

EH&S would like to thank Dr. Quick for sharing his practical application of our web-based chemical inventory system. As laboratories develop a deeper understanding of ChemTracker, EH&S will be there to offer continued support to ensure the health and safety of all investigators.

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