Chemical And Radiation Protection

Lab Safety Spectrum

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UW - Madison Safety Department Chemical and Radiation Protection
30 N. Murray St. 262-8769 http://www.fpm.wisc.edu/safety

Radioactive Materials License No. **25-1323-01** Help Line 265-5518

Radiation Training Requirements

The Safety Department offers both chemical and radiation safety training (see page 4). The training is rather interesting and its goals are several: (1) introduce persons to terms used in exposure to hazardous materials, (2) discuss safe working practices, (3) describe the hazardous waste and chemical surplus collection program, and (4) discuss emergency response. For most individuals working with radioactive materials the radiation safety block is required. Some persons working in labs with radioactive material may be exempt from this training. People who may be exempt include:

1) Students in numbered classes / labs. Lab directors are authorized users and have had their radiation safety protocol reviewed and approved by Safety.
2) Rotators. These graduate students are sampling the research in a department before final selection is made, they do not use stock vials.
3) Visitors. If a visiting researcher will be at the UW for less than 30 days, the authorized user can review that person's credentials and provide safety support.

Thus, a person coming to campus to train a research lab in a technique they developed or to learn a technique developed here, will be under the supervision of the authorized user.

What about dosimeters? Some workers say they can't work with radioactive materials until they receive their dosimeters, a process which may take 3 - 5 days.

1) You will not receive a measurable exposure in 3 - 5 days. When working with radioactive materials, you should have your survey meter near and you should check yourself and your work area for contamination both during and at the completion of your work. If you do that, you can be sure you will not be contaminated.
2) Most workers, even those with dosimeters, do not need dosimeters. The only persons who require dosimeters for radiation work are those who handle more than 1 millicurie (37 MBq) of a x-/γ-ray emitter (e.g., Cr-51, Zn-65, Rb-86, I-125) or a high-energy beta emitter (e.g., P-32). If you work with less than 1 millicurie, there is just not enough radioactive material to produce a whole-body exposure. Using your survey meter will assure you are not contaminated.

Personal Protective Equipment (PPE)

Potentially hazardous chemicals can be found everywhere. There are an estimated 575,000 existing chemical products and hundreds of new ones are introduced annually. Almost 32,000,000 workers are potentially exposed to one or more chemical hazards in the workplace. At the UW, approximately 5000 persons work in labs where hazardous chemicals are used. Yet, with all this "potential," the number of chemical injuries and complaints of exposure are very few. Why is that? Because workers receive training and properly wear PPE.

The purpose of PPE is to protect the wearer from acute exposures (e.g., acid spills / splashes) and reduce the risk of contamination and its deposition within the body. To that end, PPE consists of items like appropriate protective gloves, protective clothing, protective eyewear.

Protective gloves. Not all gloves are created equal. Vinyl and latex gloves are inexpensive, comfortable and provide a nominal barrier to common hazards. However, vinyl and latex gloves offer no protection from many corrosive or organic solvents. To choose the right glove, use a glove chemical resistant chart (http://www2.fpm.wisc.edu/chemsafety/gloves.htm) and select a glove that is "excellent" or "good" for the chemical you are using. Be aware that even the variety of gloves in this chart does not afford protection from all chemicals. For aggressive chlorinated solvents, such as chloroform and trichloroethylene, order a glove like Silvershield® or polyvinyl alcohol gloves. Remember that all gloves can be permeated by chemicals to some degree. They are not meant to provide protection from prolonged immersion in chemicals. Finally, never reach into any liquids with a gloved hand. Use tongs to retrieve items from the bottom of your acid bath. Otherwise, someday your hand could go in deeper than the cuff or the glove could fail. For reusable gloves, don't forget to wash or at least rinse off the gloves after use. This will prolong their useful life and prevent the spread of chemical contamination from the dirty gloves. If you didn't remove the gloves immediately after use, wash them as you would your hands before touching anything like faucet handles or telephones.

Protective eyewear. Eye injuries are horrifying, but preventable events. Wisconsin law requires eye protection for all laboratory workers, so no one should enter a laboratory without proper eye protection. Protective eyewear is the minimum requirement for laboratory eye protection. Wear enclosed goggles or a face shield over your safety glasses if there is a danger of splashed liquids or shattering glass. If you work with ultraviolet or laser light, wear protective lenses specific for the wavelength. Materials Distribution Services sells nonprescription glasses and many safety equipment vendors have a large assortment of eye protection. Newer models are nearly fog proof, comfortable to wear, come in a great variety of sizes and styles and are quite fashionable. There is no excuse for not

wearing eye protection in a laboratory. **Should you wear contact lenses in laboratories?** While there are urban legends regarding hazards of contact lenses in labs, OSHA believes that contact lenses do not pose additional hazards and can be worn with acceptable (i.e., ANSI Z87.1-2003) protective eyewear. That being said, be aware of the risks of wearing contact lenses. They are difficult to remove if your eyes must be washed in an emergency. Also, they can trap contaminants against your eye and they restrict the flow of natural fluids that remove minor eye contaminants. A better alternative for laboratory work is to order prescription safety glasses through the Safety Department.

Protective clothing. Wear clothing that protects your skin. Shoes should completely cover your feet; sandals are risky because they don't cover your feet. Wear long pants instead of shorts or skirts. Use a lab coat for further protection. The coat sleeves keep splashes, aerosols and dusts from touching your forearm and wrist. Have a plastic or rubber apron available for working with strong caustics or corrosives.

Respiratory protection. Before I came to the UW, I was in the Army training Medical Corps students in nuclear, biological, and chemical defensive measures. As part of that training we ran our students through a "gas" chamber (actually it contained CS, a mild irritant). I had my own mask, that was fitted to me by several chemical corps NCOs. Our masks had 3 (or 4) different face blanks and about 5 different nose pieces. Proper mask sizing and fit are crucial when using a mask for protection. Masks require constant care. A laboratory may not provide space to assure that level of care. To avoid the potential risk from poor fit or becoming overconfident because of mask use, it is best to prevent inhalation exposures by using engineering controls, (e.g., increased room ventilation, fume hoods and glove boxes) rather than respirators. Additionally, OSHA has strict requirements for respirator use (i.e., gas mask or filter mask). Even a simple paper filter mask is subject to OSHA rules. These requirements include a medical examination and a respirator fit test for all users. A medical exam is necessary because wearing respirators increases the work of breathing, which may cause health problems for some people. Also, one needs to know the identity and concentration of the air contaminant before selecting the appropriate filter to ensure that it will work. If you believe you need respiratory protection, discuss this need with Tom Kenney (tkenney@fpm.wisc.edu) the Occupational Health Officer at 262-2177.

Engineering controls. The safest way to reduce or eliminate one's exposure to airborne hazards is to use well designed engineering controls. In this way safety is designed into the process and there is less reliance upon the skill and vigilance of the worker. Examples include chemical fume hoods and glove boxes. For most labs, fume hoods are the most important type of engineering control. Remember, a biosafety cabinet is not a fume hood. Fume hoods will have a UW-Madison Safety Department sticker indicating their compliance with standard. Green "passing" stickers indicate the hood's flow met the 100 fpm flow at 18-inch opening standard. Hoods which can pull 100 fpm with a sash at 12-inch, receive a yellow "Failing" sticker. Hoods which can not meet the lower standard receive a red "Warning -- Do not use fume hood" sticker. A simply way to verify the hood is drawing air is to tape a strip of tissue to the edge of the sash. The tissue fluttering into the hood indicates air flow. This is only a qualitative test for hood function (i.e., air moving or not moving into the hood), but will indicate when a hood is NOT functioning.

Lastly, if you have to wear gloves outside the lab because you are moving a sample to another room, the best method is to use a cart. Place you sample on a cart, then remove your protective gloves and wash you hands. Put on a clean pair of gloves and move the sample. This will prevent spills and cross contamination.

BioSafety Protocol Chemical Disposal

When you complete Section F (Disposal) of the Biosafety Protocol form, the Chemical Safety and Disposal Guide discusses disposal procedures for animal carcasses and hazardous chemicals. An acceptable disposal method would be "Collection by UW Safety".

Training

Chemical and radiation safety training is available weekly. There are two types of classes. Chem AM classes have the chemical safety class beginning at 9:30 AM and the radiation safety class beginning at 12:30 PM. Rad AM classes have radiation safety classes beginning at 8:30 AM and the chemical safety class beginning at 1 PM. The schedule of these classes from 1 November, 2003 through 1 Arpil, 2004 is in the table:

Chemical AM Chemical Safety Radiation Safety	**Start Time** 9:30 AM 12:30 PM	November 5, 13, 19; December 3, 11, 17; **2004** January 5, 13, 22; February 5, 17, 23; March 2, 10, 18; April 7, 19, 28; May 3, 12, 28; June 9, 15, 21, 29
Radiation AM Radiation Safety Chemical Safety	**Start Time** 8:30 AM 1 PM	November 25; **2004** January 30; February 11; March 26; April 13, May 20; June 3

All training classes are held in the Union South. No sign-up is needed; a quiz is used to document training. Booklets for either class can be picked up at our Annex, room 62, Biochemistry. A complete listing of classes is found at http://www.fpm.wisc.edu/safety.

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