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Department of Occupational and Environmental Safety NEWSLETTER

July-August 1998 CASE WESTERN RESERVE UNIVERSITY VOL. 7 NO.4

Time for Formaldehyde Retraining?

All users of formaldehyde in concentrations greater than 0.1% need to be annually retrained. If your laboratory uses formaldehyde in this amount or greater please call our office to set up a time for training or retraining.

Formaldehyde has been regulated under OSHA since 1992, and all three regulatory agencies (OSHA, the International Agency of Research on Cancer, and the National Toxicology Program) list is as a carcinogen. It is also a reproductive hazard. Therefore, it is important that all who work with it are properly informed of its hazards and of the precautions that must be taken when using it.

Retraining for this year is ongoing; if your laboratory has not yet been retrained this year, we recommend that you call our office as soon as possible to set up a training date and time. It is easiest if the entire laboratory comes at one time. We are flexible about meeting times to accommodate the schedules of various laboratories.

The retraining session consists of an overview of the standard, an explanation of emergency response procedures, and a discussion of proper storage and labeling of formaldehyde. It lasts about 30 minutes and takes place in the Service Building Conference Room.

Please call Paige Wietelmann (x2739) to set up a retraining date or with any other questions.

Working With Hydrofluoric Acid

Like with most chemicals with a high degree of acute toxicity, work with hydrofluoric acid (HF) requires special precautions and very specific knowledge of what to do in case a spill occurs. Multiple lines of defense should be set up to minimize the risk posed by this substance.

HF is used primarily for etching and polishing glass and rocks and as a chemical catalyst for manufacture of plastics. HF is an extremely corrosive liquid and vapor that can cause severe injury through all major routes of exposure: skin or eye contact, inhalation, and ingestion.

Most accidents occur through skin contact. Like most acids, HF causes damage to the skin; however, HF is more dangerous than most because the fluoride ion severely damages underlying tissues, attacking and decalcifing the bone. Damage to the tissues and bone from HF persists hours or even days after the initial spill. The

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In This Issue:

FOCUS ON:

Safety With Corrosive Materials

A corrosive material is defined as a chemical whose action will result in an immediate, acute damage to body tissues as well as other substances. Though they are common in many laboratories, extreme care must be taken when working with these sorts of chemicals because they represent a hazard in several ways—through direct contact with the skin or eyes, through inhalation or through ingestion.

Corrosive chemical liquids such as mineral acids, alkali solutions, and certain oxidizers, are especially dangerous to the skin and eyes because splashes so easily occur when working with them. Corrosive gases and vapors affect all parts of the body, though the eyes and respiratory tract are most susceptible to damage. Highly soluble gases such as ammonia or hydrogen chloride severely irritate the nose and throat, while less soluble materials like nitrogen dioxide phosgene, and sulfur dioxide can penetrate further into the lungs, causing deep tissue damage.

Safe work practices in laboratory settings are explained in the CWRU Safety Manual. In addition to these general safety precautions, the following practices should be adhered to when working with corrosives.

Corrosive Chemical Liquids

1) Wear proper face and eye protection, and never wear contact lenses. Accidental splashing occurs frequently, and eyes are extremely vulnerable to danger.

2) Wear gloves and other chemically resistant protective clothing to prevent skin contact.

3) Flash steam explosions can occur from mixing acids and bases, as large amounts of

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We all know the importance of wearing the proper personal protective equipment (PPE) in the laboratory, including gloves, goggles, and lab coats.

Unfortunately, the proper PPE doesn't include open-toed sandals or shorts—and though over the summer months a lot of students and researchers wear these onto campus, they are unsafe in the lab. One slip of the hand could send acid down your leg or a beaker crashing and splashing to the floor at your feet.

Therefore, when entering the laboratory area, make sure you trade in your sandals for some regular shoes, and wear long pants and a lab coat to protect yourself.

Upcoming Training Sessions

Radiation (x2906)

•**New Training:** Aug. 20(9-12); Sept. 9(1-4), 29(9-12)
•**Retraining:** Aug. 26(10-11); Sept. 4(2-3), 24(2-3)
•**X-ray Training:** call office to set up training session
•**Non-Radiation Workers:** Sept. 18 (1-2)

Chemical (x2907)

•**OSHA Lab Standard:** Mondays 1-3 (Service Building Conference Room)

Bloodborne Pathogen (x2907)

•**New Training:** Mondays 3-4 (Service Building Conference Room)
• **Retraining:** (Service Building Conference Room) Sept. 1,(2-3), 25(10-11); Oct. 7(2-3), 22 (10-11)

Safety With Corrosive Materials

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heat form at the liquids' interface. To prevent these steam explosions, always add acid and bases to water and not the other way around.

4) Store acids and bases separately in the lab.

5) Store liquid corrosives below eye level.

6) Have adequate spill control equipment ready in case an accident occurs.

Corrosive Gases and Vapors

1) Use a properly functioning fume hood when working with chemicals that may be harmful if inhaled, or wear other appropriate respiratory protection.

2) Protect all skin surfaces from contact with corrosive gases or vapors.

3) Remember that warning signs such as odor or eye, nose or respiratory tract irritation may be inadequate with some substances. They should not be relied upon as a warning of overexposure.

For the most complete information about a specific chemical, be sure to check its MSDS before beginning work to familiarize yourself with its potential hazards: the chemical's Permissible Exposure Limit (PEL), proper protective equipment to wear while working with it, possible harmful effects, and what to do in case an accident occurs.

Awareness of the danger of corrosives materials is the first step in safe lab practice, so exercise the proper precautions when working with these materials. If you have any questions call Safety Services at x2907.

HOT TIPS

New Training Class for Non-Radiation Workers

The Radiation Safety Office has significantly revised its training programs for ancillary personnel, those non-users of radioactive materials who may come into contact with radiation in the workplace. Training is required for employees who enter or work in radioactive materials work areas.

It is vital that radiation workers be aware of potential harmful effects of radiation and what to do to prevent unnecessary exposure. But it is just as important that everyone who may come into contact with radioactive materials in the workplace have a "common sense" understanding of radiation. This training session explains radioactive energy by placing the subject in context with the work environment. Ancillary personnel includes support staff such as housekeeping, secretaries, student workers, or other employees (Plant Services or Shipping and Receiving) who may come into contact with laboratories using radioactive materials.

We know that there are many questions about radiation and the possible effects, if any, of being exposed to low-level radiation in the workplace. These issues are addressed in training—the "everyday" radiation that exists in the home, in the air and soil (known as background radiation), and the radiation in industry, from x-ray machines to steel mills and ceramics. Also discussed are the precautions taken by radiation workers to reduce or eliminate the possibility of contaminating themselves and their surroundings—the workplace

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Working With Hydrofluoric Acid

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vapors of HF and hydrofluoric acid can cause severe damage to the eyes and result in permanent injury. And breathing the vapors of HF can cause both immediate severe irritation to the respiratory tract as well as serious delayed reactions.

Since damage to the body can be so severe, immediate first aid after an accident occurs is imperative. The area should be flushed with water, and contaminated clothes should be removed. The employee should be taken to the emergency room right away to get immediate medical attention. If it is available, a calcium carbonate gel should be applied.

With all its hazards, HF can still be used safely if all possible precautions are put in place. Follow these steps:

1. Plan Ahead. First, see if you can substitute a less hazardous chemical for HF, which would make the experiment safer. If there is no appropriate substitute, use the smallest amount possible of HF for the experiment. Make sure everyone in the laboratory knows the hazards associated with HF use and knows what to do in case an accident occurs.

2. Create a Designated Area. This is done by clearly marking the area with appropriate signage and making sure everyone in the laboratory is aware of the nature of the work going on. Use only HF in that space. Since work with HF should always be done in a fume hood, mark the hood being used as the designated area *(See related article on page 5)*.

3. Have the Proper Controls. HF should be used under a properly functioning fume hood ONLY, as its vapors cause severe damage. Make sure the necessary PPE is in place to prevent skin contact—neoprene gloves, lab coat, and splash goggles must be worn when working with HF.

4. Store HF safely. HF reacts with glass, ceramics, and some metals. Reactions with certain metals may generate potentially explosive hydrogen gas. Therefore, store HF in its original container only, surrounded by a secondary container made of polyethylene. Keep it away from incompatible materials.

As always, general rules for the safe use of chemicals should be followed as outlined in the Chemical Safety Manual and in each laboratory's Chemical Hygiene Plan. Some material for this article was found in Prudent Practices (National Academy Press), an excellent source of information about chemical hazards. If you have any question or concerns about the use of HF, contact the Chemical Safety Office at x2907.

HOT TIPS:

New Training Class for Non-Radiation Workers

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which you also share.

Most importantly, the training puts radiation into perspective, carefully delineating between perceived dangers and the very low exposure rates that exist occupationally.

DOES stresses the importance of training to everyone concerned about or interested in radiation in the workplace. We encourage anyone who has questions or concerns about occupational exposure to radiation to contact us. Please call the Radiation Safety Office (x2906) to register for the next training class. It will be held on:

Friday, September 18, 1998
1:00-2:00 pm
Service Building Conference Room

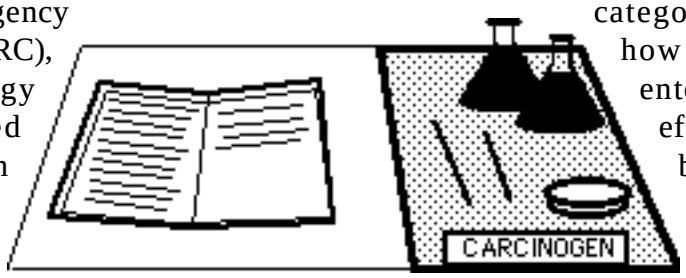
If workers do not wish to attend the non-radioactive materials user class, they can attend one of the regular retraining classes. See page 2 for upcoming times and dates.

Creating a Designated Area

In the laboratory, work with certain classes of chemicals must be sectioned off from the rest of the lab in what is called a "designated area." The OSHA Lab Standard identifies three categories of substances whose usage in the lab demands special working areas and precautions. These "extremely hazardous substances" are: carcinogens, reproductive hazards, and chemicals with a high degree of acute toxicity. They should be used only in locations specifically designated for their use.

Carcinogens

The list of select carcinogens is quite long, especially if one combines the lists offered by OSHA, the International Agency for Research on Cancer (IARC), and the National Toxicology Program (NTP) (a compiled list of Select Carcinogens can be found in Appendix C of the CWRU Chemical Safety Manual). Though many of these chemicals may seem quite ordinary, they have been designated as cancer-causing agents by one or more of these groups. Some of the most commonly used chemicals in the laboratory considered carcinogens are: benzene, chloroform, cadmium compounds, formaldehyde, and vinyl chloride.



Reproductive Hazards

Reproductive toxins are chemicals or other hazards which may manifest themselves in lethal ways on the fertilized egg, developing embryo or fetus , and which often have teratogenic (malformation) effects in the fetus. Fetal effects may include: spontaneous abortions, low birth weight, still births, neonatal deaths, congenital anomalies and behavioral or developmental disabilities. In addition, these chemicals may cause infertility or fertility disorders in both males and females. While no employee may be prevented from the performance of her job due to pregnancy, any woman who believes that she is pregnant should discuss with her Principal Investigator potential risks of exposure and ways to minimize exposure to reproductive toxins. Some common lab substances considered reproductive toxins include: anesthetic gases (halothane methoxyfluorane), benzene, carbon monoxide, ethylene oxide, ethylene thiourea, ionizing radiation (x-rays and gamma rays), other radioactive materials, and mercury.

Chemicals with a High Degree Of Acute Toxicity

These chemicals may be fatal or cause damage to certain organs after only one exposure or after exposures of short duration. Classification in this category depends both on how quickly the chemical enters the body and the effects that it has on the body. If you are unsure whether or not to designate an area for a chemical that may fall into this category,check to see if the chemical's container displaysthe diamond-shaped NFPA label. If in the blue section of this label the chemical is registered "4," then it is definitely toxic. If it is registered "3,"the chemical is still considered toxic and it is recommended that you designate an area for it; however, you may decide whether do so depending on how often and in what quantities you use the chemical. If the chemical's container does not display the NFPA sign, consult the MSDS for toxicity information or call the Chemical Safety Office (x2907). Examples of Chemicals with a High Degree of Acute Toxicity include: hydrogen cyanide, hydrogen fluoride, and nitrogen dioxide.

How to Designate an Area

To designate an area for specific use, whether it be a whole section of the lab, a fume hood, or part of a bench top, it is vital that the section be properly and clearly labelled. In addition, all employees who work in the area must be in-

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Creating a Designated Area

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formed as to the nature of the hazard. The term "employees" includes all maintenance personnel who come into contact with these areas on a regular basis, so make sure signs and labels are large, clear, and specific.

The procedure itself is no different from what you would do to label an area as radioactive—make sure proper signage is in place and that you work with those chemicals only in that area.

This information was taken from the CWRU Chemical Safety Manual. Please read over this section in greater detail if you want further information on any of the issues discussed here, or call the Department of Occupational and Environmental Safety at x2907.

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