



**Chemical
And
Radiation
Protection**

Lab Safety

Spectrum

June 2002

Volume 2 Issue 2

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

Help Line 265-5518

NRC License: 48-09843-18

Accidents Happen

You've heard that statement time and time again. But, you know that it is really a cop-out. Accidents do not "need" to happen. They happen because of either a lack of knowledge or a lack of understanding (or both). People may not be aware of the hazardous nature of the work they are doing or they may be aware of the hazard but believe they can do the task "accident-free."

One task of the Safety Department is to try to provide that basic knowledge which

The most experienced scientists can have accidents workers can build upon to create a safer work place. We do that by conducting

safety audits of labs, collecting hazardous waste, providing training, etc. But understanding is also crucial.

An example of "understanding" that people in Wisconsin can relate to: The first winter storm in Madison always has a lot of small traffic accidents. Usually these are attributed to the fact that the roads are icy and people are driving too fast for conditions. That is, they are driving like the road is dry, having

forgotten that in winter you leave more space between cars and drive slower.

Dr. Bill Sonzogni, Chair of the University's Chemical Safety Committee sent me a copy of a web page he had read called "Accidents Will Happen" (*Posted December 7, 2001 - Issue 116*) by David Bradley. Let's look at some of the safety issues that were discussed.

Sensitivity. I bought a Rolex watch in Japan in 1985. Really a nice watch and I wear it all the time. About March, 2000, I got an itch on my wrist. The itch persisted for several months and I figured it had to be due to the watch's clasp. The problem was that I had developed a sensitivity to nickel, a material used in stainless steel. I solved my problem by placing some adhesive tape under the clasp.

But sensitivities to materials you use everyday can occur. David Bradley talks about an acquaintance who "suffered a bout" of what he thought was hay fever - snuffling and runny nose, itchy and sore eyes, the usual thing. He took a few days of sick leave ... and the symptoms subsided until he went back to work and took up his (*Continued on Page 2*)



(Continued) experiment of enzymatic chemical synthesis where he had left off. The devastating result was far worse than the snuffles he had suffered before his sick leave: his neck and face went bright scarlet, and he started shaking and collapsed, gasping for air. Anaphylactic shock was the diagnosis. He had to leave his job. Although the lab in question has implemented very strict protein-powder handling control systems, it's the kind of accident that is almost impossible to predict and in the future may become more common.”

“Hay Fever” became anaphylactic shock

Your personnel should be aware of the fact that they may become sensitized to material they routinely use. Protective gloves is only one common sensitizer problem. If you feel something is different, discuss it with others. Learn to recognize the signs and symptoms of sensitization.

Scaling. The old joke about the cook who had to make a cake to feed 50 people is relevant. The cook looked at the recipe for a cake that could feed 10 people and simply multiplied all values by 5. When asked when it would be ready, was heard to remark, “Just put it in the oven, it will be ready in 150 minutes.”

A small-scale lab accident may involve someone mixing something and getting an unexpected exothermic or explosive reaction. The results often reach the community by word of mouth or through a note in the literature. For instance, Toshi Nagata of the [Institute for Molecular Science](#), Okazaki, Japan, recently reported an accident while following a literature procedure published 10 years ago. The chemical preparation involved synthesizing a brominated bipyridine, but instead of using standard quantities, Nagata's team had scaled it down to a 10th. While they were purifying

Some lab dangers are reported by word-of-mouth

the product, the 100 ml reaction flask exploded violently, injuring one of the team in the arm. Nagata suspects that the problem lay in the formation of a peroxide by-product, which would have been less concentrated on a larger scale. Nagata wrote to [Chemical & Engineering News](#), saying, "I do not intend to blame the authors for not describing the danger, but all chemists should be aware that this procedure could be dangerous.”

Preparedness. Remember, each of you is responsible for safety. Know all of the safety devices in your lab, know the hazards of the chemicals you are working with, be prepared in the event of an accident.

“In 1995, a seemingly small-scale spill of hydrofluoric acid [killed](#) a technician in Australia. He died from multiorgan failure two weeks after the incident. Several factors contributed to his unfortunate death, according to the official report. He was alone, wearing only rubber gloves and sleeve protectors but nothing covering his lap. He was working in a crowded fume hood. The lab had no emergency shower nor any calcium gluconate gel antidote available. The lessons may be obvious, but accidents happen to even the most experienced of scientists.”

Do you think 15 minutes is too long to stay under a deluge shower? Our Chemical Safety and Disposal Guide recommends washing for 15 minutes for small spills on the skin **except** for hydrofluoric acid in which case you “wash and flush for only 5 minutes and promptly apply calcium gluconate gel and immediate medical attention.”

“The slow death that befell Dartmouth chemist Karen Wetterhahn when she was exposed to a few drops of the highly toxic [dimethylmercury](#) in August 1996 took several months to kill her. Although Wetterhahn was wearing latex gloves, this compound rapidly penetrated them and was absorbed through her skin. Ironically, she was, at the time, using dimethylmercury to examine the effects of



toxic metals, such as chromium, on human cells. In October of this year (2001), Michal Wilgocki of the [University of Wroclaw](#) in Poland, a chemistry professor with thirty years experience, died after an explosion in his laboratory. Firefighters have suggested the accident may have happened while Wilgocki was drying unstable perchlorates."

Responsibility. One of those things that is always asked after an accident occurs is, "who's responsible?". According to [Jim Kaufman](#) of the [Laboratory Safety Institute](#) (LSI), "There are three levels of responsibility. First is management. Safety is their responsibility. Preventing accidents and injuries is their responsibility. If you manage others, you are responsible for their health and safety. You have to enforce the rules," he explains. "Second is the

Chemical Hygiene Officer and the lab's safety committee. They are advisers and recommenders. Third is everyone. Everyone needs to be responsible for health and safety. Follow the rules, report accidents, injuries, and unsafe conditions."

The Safety Department is here to help you do your work. We offer a weekly training class which takes about 90 minutes and discusses types of hazards, protective measures, disposal, and emergencies. We revised our "Chemical Safety and Disposal Guide" to make it more readable. We have a help line (5-5518) for those chemical questions which no one seems to have the answer for; try to stump our chemist (he likes to learn new things and is not afraid to say, "I never thought of that.").

.....
: **Everyone is** :
: **responsible for** :
: **safety** :
.....

Radionuclide Inventories

CORD maintains the UW radioisotope inventory by PI and isotope. Each lab is responsible for having their own inventory of receipt, use, and disposal. CORD assists the lab's inventory process by giving a **Radionuclide Inventory** sheet with every stock vial. In fact the inventory sheet is the lab's CORD invoice. The receipt and use portion of the inventory is obvious. Receipt is listed as the activity in the vial received. Then, every time an aliquot is removed from the vial by a lab member, they should subtract that amount from the activity in the vial and calculate the remaining activity.

But, what about disposal? We recommend that labs not hold radioactive materials for decay. There is no benefit. The person who withdraws an aliquot should dispose of that entire activity to the lab's waste streams. The question is, how to document the Radionuclide Inventory sheet and the lab's waste disposal records?

One easy solution is to keep a log for each large container of radioactive waste. Thus, a lab might have a sheet for each of their ³²P, ³³P, ³⁵S boxes. Every time a person puts radioactive waste in the box, they write on the inventory sheet for that box: date, activity (millicuries or microcuries), CORD RSR # (this is CORD's tracking number) for that radioactive material, and their initials. They would also complete their Radionuclide Inventory sheet with the same information. When the waste is ready to be disposed, the bag is taped, the box is taped shut, the waste box inventory sheet summed, the Radioactive Waste Disposal form filled out for that activity. The waste log sheets could be filed with the CORD inventories and Radioactive Waste Disposal forms.

When you receive an order, the inventory sheet provides a summary of how much radioactive material you have on hand and on order (but not yet received). If there is a discrepancy, it is most likely for material ordered, but not received. It is important to insure that the amount being disposed is equal to the amount being used. If you remove a 0.1 mCi aliquot for your project, dispose (by liquid or solid) 0.1 mCi. For material with half-lives less than 120 days, exact quantities in both the liquid and solid waste streams is not as important as recording the total activity because the Safety Department holds all these wastes for 10 half-lives before disposal.



Annex Moving?

The Safety Department has a small annex at which you can pick up training materials, tags, waste disposal forms, etc., that is open from 11 AM - 2 PM. The annex is currently located in Room 19, Biochemistry, however, we have been told we will be moving to another location about 1 June. We will include the new address on our Web site (<http://www.fpm.wisc.edu/safety>) and will try to get the word out via e-mail. Check the web site before coming.

Training Schedule June - October

Chemical and Radiation Protection offers training classes. The Chemical Safety training class begins at 9:30 on the same day as the Radiation Safety training class which begins at 12:30.

The training schedule from 1 June through 30 October (all classes are held at Union South) June 3, 10, 17, 27, July 3, 9, 15, 26, August 1, 7, 13, 23, and September 4, 9, 16, 23. Additionally, the schedule is flipped twice each semester and the Radiation class is held at 8 AM with the Chemical class held at 1:30. The dates when the **Radiation class is in the morning (and Chemical class in the afternoon)** are: June 14, 21, August 29 and September 6, 13. No sign-up is needed, just show up. A quiz is used to document training. Booklets for either class can be picked up at our annex which is room 19, Biochemistry. As always, our web site has a complete listing.

UW-Safety Dept.
30 N. Murray St. 53715-1227

(608) 262-8769

Help Line: (608) 265-5518