

**Environmental Safety
Health and Update
Safety Newsletter**

S a n F r a n c i s c o

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E T H I D I U M B R O M I D E

One of the more commonly used chemicals at UCSF is ethidium bromide. The Office of Environmental Health and Safety (EH&S) gets frequent inquiries about the properties of the chemical, safety precautions and proper waste disposal. Material Safety Data Sheets (MSDSs) provide very little information about the hazards of the chemical.

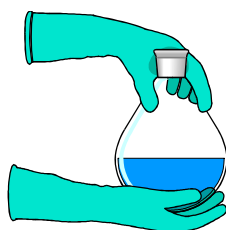
Ethidium bromide is routinely used for fluorescent staining of nucleic acids. It is considered easy and inexpensive to use. It is, however, considered to be a mutagen and is moderately toxic, and as such, should be treated with respect.

Ethidium bromide (EB) is sold as a red, crystalline powder, in tablets or pelletized form, and as a solution in water. Because it is a mutagen, the powder should be handled in a fume hood, and protective gloves and eyeguards should be worn. Procedures which might generate ethidium bromide dust or aerosol should be conducted in a fume hood to prevent exposure by inhalation.

In the event of skin contact, contaminated clothing should be removed, and the skin washed with soap and water. Ethidium bromide can be absorbed through the skin. In case of eye contact, eyes should be flushed with water for at least 15 minutes. If the material is inhaled, the person should be immediately removed to an area with fresh air, and given medical attention. If the material is ingested, immediate medical attention is required.

If a solution of EB is spilled, it should be absorbed with paper towels, a spill pillow, or other absorbent material. If the powder is spilled, the powder should be covered with WET paper towels, in order to avoid raising dust. The material is readily soluble in water, and should be absorbed by the wet paper towels or similar absorbent. A UV light source can be used to locate spills, and to assure the spill has been cleaned up. Remember to avoid skin and eye exposure to the UV light.

In addition to being classed as a mutagen, ethidium bromide is also reported to cause skin and eye irritation. It causes respiratory tract irritation when inhaled. Data on permissible exposure levels (PELs) and LD50/LC50 were not found.



Information on teratogenicity, neurotoxicity, and on chronic exposure effects were not found. Environmental toxicity and environmental fate information were not found.

Ethidium bromide is not considered flammable, but decomposition products include nitrogen oxides and hydrogen bromide gas. Ethidium bromide should not be combined with strong oxidizing agents.

EH&S has published instructions on proper handling and disposal of buffers and gels containing ethidium bromide.

Strict adherence to these procedures is required. The procedures are summarized here; for more information call your Department Safety Advisor.

Ethidium bromide gels should be collected in a wide mouth glass jar; the jar lid must provide a good seal. When the jar is filled, close the lid tightly. Fill out a hazardous waste tag. Include the concentration of ethidium bromide on the tag. Attach the tag to the jar, and follow standard EH&S procedures for hazardous waste pick up.

For buffer solutions containing ethidium bromide, collect them in a large screw top bottle or a plastic bucket with a snap-on lid. Use a transparent plastic bag for contaminated waste debris. Use hard-sided containers for contaminated glass. Make sure the hazardous waste disposal tag identifies the ethidium bromide and the concentration.

EH&S has also evaluated several procedures for detoxification of ethidium bromide. Household bleach is a component of several of the procedures for detoxifying ethidium bromide. Unfortunately, treatment with bleach produces a spectrum of oxidation products, some of which are more mutagenic than the original compound. These procedures are not to be used.

Detoxification is considered a treatment process by the California Department of Toxic Substances Control and requires a special permit. However, if the detoxification is included as a part of the experiment protocol, it is not considered treatment and does not require a permit.

ACCIDENT-PROOFING THE LAB

A recent laboratory accident serves to point out that there are risks associated with working with hazardous materials, even if employees are well-trained and safety conscious.

The accident scenario went, as nearly as we can reconstruct, something like this:

A Staff Research Associate (SRA) was preparing slides for a cgh array experiment. The procedure includes washing the slides with an acid solution, followed by water rinses, then acetone washes, prior to the actual array preparation.

The acid wash process was carried out in a fume hood. She was clearing out the fume hood following the acid washes. She poured the contents of the coplin jars into a waste collection bottle, and the waste bottle exploded. She thought she was pouring the acid waste into the acid waste collection bottle.

The waste bottle exploded. Flying glass cut her left forearm, acid sprayed into her face, and her prescription eyeglasses were broken. The gash required immediate first aid to slow the bleeding, followed by stitches. She was able to wash the acid from her skin. Her prescription glasses did keep glass and acid out of her eyes.

The explosion imbedded glass in the back wall of the fume hood, in a face shield hanging nearby, and in the walls outside the fume hood. Acid was sprayed approximately six to eight feet into the room. It took the Office of Environmental Health and Safety (EH&S) Emergency Response Team about four hours to neutralize the acid and clean all glass from the area.

The accident was investigated both by EH&S and by the department's safety committee. Both had similar findings:

- The explosion was essentially instantaneous, and did not allow time

to do anything to protect the employee or minimize the damage.

- The coplin jars were unlabeled; one or more may have contained acetone rather than the acid solution, and when poured into the acid waste container caused the explosion.
- The protocol being used was fairly new, and did not contain any safety precautions about the hazardous materials being used.
- The employee was not wearing a lab coat, which would probably have protected her from flying glass and prevented the cut to her arm.
- The employee was not wearing safety glasses or the readily available face shield. The face shield would have protected her from the acid or the glass flying in her face.
- The fume hood sash was open to its maximum allowable position. Had it been pulled down, the glass and acid would have been mostly contained inside the fume hood, and the employee would have had minimum exposure to the flying materials.

EH&S recommends a number of safety steps to prevent similar accidents. These include:

- Each laboratory employee should be thoroughly trained to understand the hazards of the materials used in the lab. EH&S offers a short laboratory safety training class for new employees. Each laboratory supervisor or Principal Investigator (PI) should train the lab's employees on the hazards specific to the materials and equipment used in that laboratory. The lab supervisor or PI should also keep records of all safety training given to the employees.

- Laboratory procedures should be written in a manner that identifies hazardous steps or hazardous materials use. This should include instructions to perform the procedure in a fume hood, if appropriate, and specific instructions in handling hazardous materials safely. One way to accomplish this is by incorporating "Caution" or "Warning" notes into the procedure itself. EH&S can help with this process.
- Laboratory procedures should be reviewed periodically with intent to mitigate any hazards. For example, the use of less hazardous chemicals or smaller volumes of the chemical will lessen the risks to employees.
- Laboratory supervisors should make certain proper personal protective equipment (PPE) is available, and to make certain employees use the PPE. Employees must also take responsibility for use of the proper PPE.
- All containers into which chemicals are transferred must be labeled with the contents and with the associated hazards; the hazard information can be obtained from the label on the original chemical container or from the Material Safety Data Sheet (MSDS). Waste containers must also be properly labeled.

(Continued on page 3, see Lab)

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email:

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(Lab, continued)

- Each employee should know the location of the nearest deluge shower and eye wash and how to use them. Usually, skin and eyes should be flushed with water for at least fifteen minutes following exposure to a hazardous chemical.
- All employees should be aware of their department's safety committee, the names of the members, and how to contact the committee for safety issues. Employees should also be familiar with the Employee Safety Suggestion / Hazard Report form and how to submit it to EH&S.

MORE USEFUL WEB SITES

The following are a few more safety-related Web sites that you may find useful:

Agency for Toxic Substances and Disease Registry:
<http://atsdr1.atsdr.cdc.gov:8080/atsdrhome.html>

U.S. Department of Health and Human Services:
<http://www.dhhs.gov/>

National Institute of Environmental Health Sciences:
<http://www.niehs.nih.gov/>

National Institute of Occupational Safety and Health:
<http://www.cdc.gov/niosh/homepage.html>

Consumer Product Safety Commission:
<http://www.cpsc.gov/>

FIRST AID KITS

Is there a First Aid Kit in your work area? Are you familiar with the contents - and when and how to use them? Is someone assigned to make certain that critical items are restocked as used? Is there someone trained in First Aid? Few of us think too much about First Aid Kits - other than as a source for an adhesive strip to cover a paper cut.

First Aid is important in two very different situations. As the first step taken when a person is seriously injured on the job, before professional help arrives, First Aid is often life-saving. When minor injuries occur, First Aid can eliminate lost work time for trips to a doctor.

According to "Occupational Health & Safety, April 1998", First Aid Kits are beginning to attract the attention of OH&S organizations such as OSHA, the American National Standards Institute (ANSI) and insurance companies. There is a move to define a minimum set of contents appropriate for First Aid kits in various industries, and to require the presence of First Aid kits in many business and industry environments. Insurance companies see real cost savings when minor injuries are treated promptly at the worksite. Businesses are recognizing the value of taking care of employees and of keeping them on the job.

If you do maintain a First Aid Kit in your work area, consider the following points:

- The First Aid Kit should be readily accessible when needed. Don't depend on the presence of a specific person to unlock a cabinet, etc.; the person may not be there when the kit is needed.
- The kit should be protected from environmental factors like water and dust.
- Make certain someone is assigned to check and replenish the contents

regularly. The kit is of no use if empty, and may give employees a false sense of security.

- Make certain that instructions on the use of the various items are included.
- Think about the items in the kit in terms of minor injuries that occur in your work place. For example, if there are workplace hazards known to cause minor burns, consider including a burn ointment.

ANSI is recommending the following items as a minimum baseline for all First Aid Kits:

- absorbent compress
- adhesive bandages
- adhesive tape
- antiseptic applications
- burn treatment
- medical exam gloves
- sterile pads
- triangular bandage

Other items to be considered include:

- gauze
- hydrogel dressings
- cold packs and sprays
- eye washes
- eye pads, dressings
- splints
- pain relief products
- forceps
- one-way valve CPR mask
- "Over the counter" cough / cold products
- "Over the counter" headache products

Other common elements of a First Aid program include deluge showers and eyewashes, knowledge of emergency phone numbers and contacts, recognition of common hazards, and training.

Training is becoming an increasingly important consideration for First Aid.

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**PLEASE HAVE ALL PERSONNEL IN
YOUR LAB INITIAL HERE AS
EVIDENCE OF CONTINUING
EDUCATION, AND KEEP THIS
NEWSLETTER IN YOUR LOGBOOK.**

(First Aid, continued)

It's useful to have one or more people who have had First Aid training (and CPR training as well), and who know the proper ways to handle worksite injuries.

Improper treatment may even be harmful! First Aid and CPR training are available at UCSF's CPR Center (476-1817). Training is also available from the American Red Cross, the National Safety Council, and other commercial enterprises.

For serious injuries, contact Employee Health or the Emergency Room.

**REPORTING
HAZARDOUS CONDITIONS**

Occasionally we all encounter situations in our work place that we think might be hazardous. The trouble

is, we don't know what to do about them. How do we find out if there really is a hazard? How do we get the hazard fixed? How do we notify others in the workplace of the hazard?

There are several avenues open to each of us. The best approach is to talk to the worksite supervisor, lab manager, Principal Investigator, or other person of authority for that worksite. Sometimes, however, talking to the supervisor isn't realistic or practical. The next logical step is to contact your department safety committee.

The UCSF Injury and Illness Prevention Program (IIPP) requires each department to have a safety committee; one role of that committee is to address workplace hazards in the department. Since members of the safety committee are familiar with the activities in that department, they are especially effective at understanding the seriousness of the hazard, and looking for solutions that minimize

the hazard and accommodate the work to be done.

If for some reason, it isn't possible to get resolution within your department, the Office of Environmental Health and Safety (EH&S) is available to help you. You may call your Department Safety Advisor or EH&S at 476-1300. You may also send an e-mail, or submit your concerns in writing. Your department's IIPP includes a form for submitting safety suggestions and hazard reports to EH&S; this form is also available on the EH&S web site (under forms). You may wish to remain anonymous. EH&S respects your desire.

Another mechanism for dealing with your workplace hazards is to become an active member of your department's safety committee. Most department committees welcome new members. Talk with your department's safety committee chairman about the role you can play!