Syracuse University
Laboratory Guidance Document

Ethidium Bromide

This Laboratory Guidance Document was created by Syracuse University Environmental Health & Safety Services (EHSS) to assist researchers in developing laboratory specific standard operating procedures for the handling, storage, and disposal of ethidium bromide.

Potential Hazards:

Ethidium bromide (EtBr) is a potent mutagen that is commonly used in molecular biology laboratories. It is toxic and may be fatal if swallowed, inhaled, or absorbed through the skin. Minor exposures may cause irritation of the skin, eyes, and respiratory tract. The toxic and mutagenic properties of this substance are of great safety concern and require special care in handling and disposal.

Physical & Chemical Properties:

Ethidium bromide fluoresces a red-orange color under ultraviolet light when bound to double-stranded DNA. EtBr is typically purchased in solution form, but is also available as a dry powder. The powder form is odorless and appears dark red in color. EtBr is incompatible with strong oxidizers (e.g., bleach) but is otherwise stable under ordinary use and storage conditions.

General Precautions:

SYBR Safe and GelRed DNA stains are safer alternatives to EtBr and are strongly recommended. If EtBr must be used, pre-mixed stock solutions should be purchased in lieu of preparing solutions from the powder form. As with all teratogenic and suspect teratogenic substances, use by pregnant persons warrants careful consideration.

1. **Training.**
   The Principal Investigator (PI) is responsible for ensuring all personnel under their supervision are aware of the hazards of EtBr, have received appropriate hands-on training, adhere to the laboratory standard operating procedures, and are provided with the appropriate personal protective equipment.

Personal Protective Equipment (PPE):

In addition to the standard laboratory attire (i.e., long pants and closed toe shoes), the following PPE is recommended for all protocols involving EtBr:

- ANSI certified (Z87) chemical splash goggles
- Face shield when viewing EtBr stained gels under ultraviolet light
- Nitrile gloves

Best Practices for the Safe Handling of Ethidium Bromide:

1. Review the Safety Data Sheet (SDS), laboratory standard operating procedure (SOP), and emergency response procedures before starting any protocols requiring EtBr.
2. Designate a laboratory area for EtBr use and storage; post a hazard warning sign (*Appendix I*) and emergency response procedure.

Best Practices for the Safe Handling of Ethidium Bromide (cont'd):

3. Place bench paper over the work area to prevent contamination of the surfaces.
4. Perform all operations involving powder or crystal forms of EtBr inside a fume hood. Use of pre-mixed stock solutions is strongly recommended.
5. Transport even small quantities of EtBr in secondary containment.

Storage:

- Store EtBr powder and solutions in a cool, dry area away from strong oxidizing agents.
- EtBr powder and solutions should be in a tightly closed, shatter-resistant container with secondary containment during storage and transportation.

Disposal & Waste Management:

Ethidium bromide may present a hazard if poured down the drain untreated or placed in the trash. Dispose of EtBr containing electrophoresis buffers and contaminated materials (e.g., pipette tips) as hazardous waste. EtBr containing gels can be dried inside a fume hood and disposed of as hazardous waste.

Ethidium bromide in solution can be removed by filtering through a bed of activated charcoal. The clean filtrate can be drain disposed while the EtBr bound charcoal filter is disposed of as hazardous waste.

The following products are effective for the removal of EtBr in solution:

- Powdered activated charcoal
- Extractor Funnel Kit
- MP Biomedicals Green Bag

Spill Response:

Only personnel who understand the hazards of EtBr and are confident in their ability to safely and properly clean the spill should perform the cleanup.

- EHSS and/or the lab personnel may clean small EtBr spills by absorbing the spill with paper towels then decontaminating the spill area with water. Following decontamination, an ultraviolet light source can be used to locate any remaining EtBr on surfaces. All cleanup materials contaminated with EtBr should be disposed of as hazardous waste.
- EHSS will oversee and direct the cleanup of large spills. Depending on the location and/or severity of the spill, EHSS may seek assistance from an outside emergency response services provider.

First Aid:

The manufacturer's Safety Data Sheet (SDS) for the EtBr used in the laboratory should be used as a reference for determining appropriate first aid measures. Contact DPS (315.443.2224 or 711 from campus landline or #78 from mobile phone) in the event of an exposure to EtBr.

Appendix I. Hazard Signage.

Post this warning sign at all storage and use areas.