HARVARD
Campus Services
ENVIRONMENTAL HEALTH & SAFETY

Laboratory Safety Guideline

Ethidium Bromide (EtBR) [CAS 1239-45-8]

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Overview

This document outlines minimum expectations for use of ethidium bromide in Harvard labs. Departments or labs may choose to implement more stringent requirements for those operating in their spaces.

Ethidium bromide is commonly used as a nucleic acid stain due to its ability to bind DNA. It comes as a dark red crystalline powder and fluoresces under ultraviolet (UV) light.

Hazards

Hazard Symbol	Hazard Description
	Fatal if inhaled. Avoid working with ethidium bromide in the powder or crystal form. Order pre-diluted stock solutions. Harmful if swallowed.
	Suspected of causing genetic defects.

Training

Lab personnel working with ethidium bromide must complete applicable EH&S training and keep it up to date.

- General Lab Safety: Renewed annually.

- Laboratory Safety Orientation Checklist: Completed for each lab a person works in and kept on file by the lab.
- Laboratory Biosafety: If using biological materials such as nucleic acids; renewed annually.

In addition, ethidium bromide users and those working in spaces where this chemical is used should review this document and be familiar with emergency procedures.

Precautions

Personal Protective Equipment

Proper personal protective equipment (PPE) and attire are important whenever working with hazardous chemicals. Each space should have a lab-specific PPE Assessment posted for reference by lab users.

The following table outlines basic requirements. More information can be found on the EH&S Lab PPE webpage.

PPE Type	Requirement
Attire	Wear a combination of clothing and shoes that fully cover the legs and feet.
Eye and Face Protection	Wear safety glasses with side shields at a minimum when handling stock solutions or when removing hot solutions from the microwave. Safety glasses are strongly recommended when handling gels and buffer solutions. Use safety goggles when there is a greater risk of splashes and for spill cleanup. Use a combination of safety glasses and an UV-protective face shield if using unguarded UV lights such as UV transilluminators.

PPE Type	Requirement
Gloves	Wear compatible chemically resistant gloves when handling potentially hazardous chemicals. At a minimum, wear nitrile gloves when handling ethidium bromide. Double-glove when handling stock powder or crystal ethidium bromide. Heat-resistant gloves are recommended when removing hot solutions from the microwave. Glove compatibility with other chemicals used in combination with ethidium bromide must also be considered. Refer to each chemical's Safety Data Sheet (SDS) and the EH&S Lab Glove Selection Guide for help identifying compatible gloves.
Lab Coat	Lab coats are required when handling ethidium bromide, such as when carrying stock bottles or preparing gels.
Respiratory Protection	Respiratory protection should not be needed if using dilute solutions or engineering controls such as fume hoods or local exhaust ventilation. If work with powder or crystal ethidium bromide is conducted without engineering controls, contact EH&S for an assessment.

Before Starting Work

- Determine if a less hazardous substance can be used instead of ethidium bromide, such as SYBR Safe or SYBR Green stains.
- Review the manufacturer's Safety Data Sheet (SDS) and additional chemical safety information available on the EH&S website.

- Be familiar with the general University emergency procedures in the EH&S Lab Emergency Response Guide.
- Identify the location of the nearest eyewash and safety shower and verify that they are accessible.
- Locate and verify that appropriate spill cleanup materials are available.

During Work

- **Avoid inhaling ethidium bromide!**

  Perform operations involving powder or crystal forms of ethidium bromide in a certified chemical fume hood or other approved ventilated enclosure when possible.

  Keep sash lowered as much as possible. Always work at least 6 inches into the fume hood and behind the sash.

- **Avoid any contact with ethidium bromide!** Wear PPE as outlined in the PPE section of this document.
- Wash hands and forearms thoroughly with soap and water each time gloves are removed.
- Be aware of potential incompatibilities, such as oxidizing agents.
- Keep all containers tightly closed when not in use and during transport.

After Completing Work

- Clean work area. Pay particular attention to ensuring any spilled ethidium bromide has been cleaned.
- Return ethidium bromide and other chemicals to appropriate storage following the Lab Chemical Storage Guide. Ethidium bromide stock solutions and powder should be stored away from strong oxidizing agents in a cool, dry place. The container must be kept undamaged and tightly closed.
- Disposal methods for ethidium bromide and its alternatives depends on the type of waste produced.

Waste Type	Disposal Instructions
Ethidium bromide stock solutions and powder-contaminated or crystal-contaminated materials.	Manage and dispose of as a hazardous waste. Mark “toxic” as the chemical hazard on the waste tag. Note that SYBR Green and SYBR Gold stock materials do not need to be treated as hazardous chemical waste.
Agarose gels with trace amounts of ethidium bromide (less than 0.5 µg/ml), SYBR Green, SYBR Gold, and other similar nucleic acid stains.	Not regulated as hazardous wastes. However, must be collected for removal as Disposal Restricted Waste (DRW). • Collect gels in closed containers with a DRW label, available through the Chemical Waste Pickup/Services Online Request form. • Once three-quarters full, request a pickup. Alternatively, place in a sealed Ziplock-style bag or dry out, then place in trash.
Buffer solutions containing trace amounts of ethidium bromide, SYBR Green, or SYBR Gold.	Disposed of down the drain if no other chemical components require collection as hazardous waste. Refer to Hazardous Waste Procedures for more information.
Pipette tips with trace amounts of ethidium bromide or other gel stains.	Not considered hazardous waste.

- Wash hands and forearms thoroughly with soap and water before leaving the lab.

Emergency Procedures

Refer to the Lab Emergency Response Guide and the information outlined in this section.

Notify Principal Investigator (PI) or supervisor of any exposures or incidents involving ethidium bromide. The PI or their designee must report all exposures or injuries within 24 hours.

First Aid

- For serious medical emergencies, go to the closest emergency room or call 911.
- For non-emergency medical attention, contact the Occupational & Environmental Health Network (OEHN) hotline at 1-866-360-8100.

Skin Contact

Treatment starts immediately following exposure.

- Remove all potentially contaminated clothing and jewelry and treat anything that can't be decontaminated as hazardous waste.
- Flush affected skin area using sink if on hands or arms or safety shower for 15 minutes.
- Follow up with OEHN at 1-866-360-8100 for minor skin exposure.

  Call 911 for major skin exposure.

Eye Contact

- Rinse eyes at an eyewash station for at least 15 minutes.
- Seek medical attention.

Inhalation

- Move person to a location with fresh air.
- Seek medical attention.

Ingestion

- Do not induce vomiting if ethidium bromide is swallowed.
- Never give anything by mouth to an unconscious person.
- Call 911 for medical assistance.

Sharps Injury

- Immediately wash the area with soap and water for at least 15 minutes.
- Seek medical assistance.

Spill Response

A person may assist in the clean-up effort of small amounts of ethidium bromide if trained and comfortable.

Alert others of the spill before performing cleanup.

If the spill is too large to clean up with the available materials, or if uncomfortable performing the cleanup, contact the Operations Center by calling 617-495-5560. Harvard Medical School and Harvard School of Dental Medicine labs should call 617-432-1901.

Stock Solution Spills

- Wear PPE described in the Personal Protective Equipment section and use appropriate spill supplies.

- Do not use bleach solutions to clean up ethidium bromide contamination. It is not effective and can be explosive under certain conditions.
- Soak the spill up with paper towels or other absorbent. Place absorbents in a secondary container that does not leak.
- Once the area is dry, spray the affected area with Simple Green and scrub the area with steel wool or a Brillo pad for several minutes.
- Use paper towels to dry up the area, then wipe the area down with absorbents dipped in tap water. Repeat this process until the area is clean.
- Using a UV light, check the area to ensure that all the ethidium bromide has been removed. Wear a face shield in addition to other PPE when the UV light is on.
- Repeat decontamination procedure as necessary.
- Place all contaminated towels, pads and other debris in a secondary container. Treat as hazardous waste, with “toxic” listed as the hazard on the hazardous waste tag.
- Request a waste pickup.

Powder or Crystal Spills

- Wear PPE described in the Personal Protective Equipment section and use appropriate spill supplies.
- Place wet paper towels soaked in Simple Green, detergent, or water over the contaminated area. Wipe the material up, then place towels in a sealed container.
- Once this is completed, follow Stock Solution Spills instructions to clean the area.

Fire

- In the event of fire, evacuate and bar further entry.

- Activate the fire alarm and leave the building.
- Once at a safe location, call 911 to notify them of the nature of the alarm.

Supporting Documents

- Chemical Waste Pickup/Services Online Request
- EH&S Lab Glove Selection Guide
- Lab Emergency Response Guide
- Lab Glove Selection Guide
- Lab PPE Webpage
- PubChem Ethidium Bromide Laboratory Chemical Safety Summary (LCSS) Datasheet
- Safe Chemical Work Practices