Laboratory Standard Operating Procedure for:

# Ethidium Bromide

## Description

*This standard operating procedure outlines the handling and use of Ethidium Bromide (EtBr). Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling EtBr.*

EtBr intercalates double-stranded DNA and RNA and acts as a frameshift mutagen. It can also be used in conjunction with acridine orange to differentiate between viable, apoptotic and necrotic cells.

## Safer Alternative to Ethidium Bromide

A recommended, safer alternative to ethidium bromide is using *Gel Red* as a gel staining agent for nucleic acid work (dsDNA, ssDNA or RNA) in agarose gels or polyacrylamide gels. It is not only highly sensitive but also tested to be environmentally safe and non-hazardous. Click the following link below for more details:
http://www.ocs.umich.edu/pdf/GelRedFactSheet.pdf

## Potential Hazards

- EtBr is an odorless solid that is irritating to the eyes, skin, mucous membranes and upper respiratory tract.
- EtBr is a potent mutagen and should be treated as a possible reproductive hazard and carcinogen.
- Consult the SDS and Laboratory Chemical Safety Summary for Ethidium Bromide in *Prudent Practices in the Laboratory* (National Academies Press).

## Engineering Controls

Stock solutions of EtBr should be prepared in a chemical fume hood. If aerosols may be produced (dust or liquid mist), EtBr must be handled in a chemical fume hood, exhausted biological safety cabinet with negative pressure ductwork, or other exhausted enclosure. Aerosols may be produced during any open handling of dry powder, and during open or pressurized manipulations of solutions.

## Work Practice Controls

- Set up a designated area for work with Ethidium Bromide, and label it with the following wording: “Ethidium Bromide in use. Mutagen and irritant.”
- Line the work area with a disposable plastic-backed absorbent pad.
- Keep containers closed as much as possible.
- If weighing dry powders and the balance cannot be located in a fume hood or BSC, tare a container then add the material to the container in a hood and seal the container before returning to the balance to weigh the powder.
- Change gloves regularly (at least every two hours) and wash hands at the time of the glove change. No skin contact is permitted.

## Protective Equipment

- Standard nitrile laboratory gloves and a fully buttoned lab coat with sleeves extending to the wrists should be worn when handling EtBr (powder and solutions).
- If splashes may occur, wear goggles and a face shield. Otherwise, wear standard laboratory safety glasses.
- When using a UV light to visualize EtBr contamination, wear UV-blocking eyewear or work behind a UV shielding glass. (Most standard safety glasses will block UV, but employees should check the approval of their safety glasses.)
- In cases where the arms or torso may be exposed to liquid suspensions or dry particles, wear Tyvek sleeves and/or gowns (or other air-tight non-woven textile).

## Transportation and Storage

- EtBr powder and solutions should be in tightly closed, shatter-resistant containers during transportation and storage. Secondary containment is advised.
- It should be stored away from strong oxidizing agents in a cool, dry place.

## Waste Disposal

EtBr waste in concentrated or solid form is collected as chemical waste and should not be flushed down the drain or disposed of in the trash. Waste should be properly labeled and handled.

**Liquids:** Non-aqueous solutions and solutions containing EtBr concentration will be picked up by EHS. EHS provides 1-gallon or 5-gallon pails for solid waste and gels, 1-gallon glass jugs for liquid waste, and smaller waste containers. Contact EHS at (313) 593-0921 for assistance.

**Contaminated sharps (needles, syringes, slides, broken glass, etc.):** Discard in an infectious waste sharps container clearly labeled "CHEMICAL CONTAMINATED SHARPS-DO NOT AUTOCLAVE".

**Solids (contaminated gloves, centrifuge tubes, towels, etc.):** Store in a properly labeled 1-gallon or 5-gallon pail for disposal as chemical waste. Do not use glass containers.

**Gels:** Gels should be disposed of as contaminated solids described above.

Because most spent, unused and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers. Contact EHS at (313) 593-0921 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to EHS's Hazardous Waste Webpage for more information.

Handle and store corrosive wastes following the guidelines above while accumulating wastes and awaiting chemical waste pickup. Contact EHS to schedule a waste pickup.

## Exposures/Unintended contact

***If the employee is in need of emergency medical attention, call 911 immediately***

For an actual chemical exposure/injury:

- Remove contaminated clothing. Flush exposed eyes or skin with water for at least 15 minutes. Seek medical attention (see below).
- For inhalation exposure, remove all persons from the contaminated area. **Get medical aid**.
- If an ambulance is needed, call Public Safety at (313) 593-5333 or 911 from a campus phone to request assistance.

Report all work related accidents, injuries, illnesses or exposures to WorkConnections within 24 hours by completing and submitting the Illness and Injury Report Form. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

Complete the EHS Laboratory Incident and Near-Miss Report form.

**TREATMENT FACILITIES:**

**Midwest Medical Center -- *Campus Employees (including student employees)***
Mon-Fri 7:30 am - 4:30 pm
**9301 Middlebelt Road**
Romulus, MI 48174
Phone: 734-941-1000

After hours - go to:

**Midwest Medical Center**
Open 24/7
4700 Schaefer
Dearborn, MI 48126
Phone: 313-581-2600

**Henry Ford Medical Center-Fairlane -- *University students (non-life threatening conditions)***
19401 Hubbard Drive
**Dearborn, MI 48126**
**Phone: 313-928-8278**

Click here for additional accident and injury reporting information.

## Spill Procedure

- When a spill occurs, ***personal safety should always come first.***
- Alert and clear everyone in the immediate area where the spill occurred.
- Small spills of EtBr solutions should be cleaned by laboratory staff. For large spills outside the fume hood, evacuate/restrict access to the laboratory and contact EHS at (313) 593-0921.
- Individuals cleaning spills must wear appropriate protective equipment as described in the Personal Protective Equipment section of this document.
- Spills of EtBr solutions should be cleaned using absorbent pads followed by surface decontamination using soap and water. Spilled dry material should first be covered with moist absorbent pads to avoid generation of dust.
- Ensure all materials contaminated as a result of the cleanup process are collected and disposed of as hazardous waste as described in the EtBr Waste Disposal section of this document.

**Additional Spill Links:**

- Chemical Spill Control Information

**Report all emergencies, suspicious activity, injuries, spills, and fires to Public Safety by calling at (313) 593-5333 or 911 from a campus phone. Register with the University of Michigan-Dearborn Emergency Alert System.**

## Training of personnel

All personnel are required to complete the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*) via MyLINC. Furthermore, all personnel shall read and fully adhere to this SOP when handling EtBr.

## Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab manager if I plan to modify this procedure.

| Name | Signature | UM ID # | Date |
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**Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator?** ☐ **YES** ☐ **NO**

**Principal Investigator** _____ **Revision Date** _____