



UCSC Laboratory Safety Services
Providing a little slug of information on.....

ETHIDIUM BROMIDE

Chemical Information Sheet

Chemical Information Overview

Ethidium bromide is a large, flat basic molecule that resembles a DNA base pair. Because of its chemical structure, it can intercalate (or insert) into a DNA strand. Ethidium bromide is commonly used in molecular biology laboratories to stain electrophoresis gels. The compound forms fluorescent complexes with nucleic acids and these can be viewed under UV light.

Ethidium bromide is a known mutagen in certain animal and microorganism test systems. Although the compound has not been thoroughly evaluated in humans, based on current toxicity data and its interaction with DNA it should be handled with considerable caution.

Chemical Name: Ethidium Bromide
Chemical Formula: $C_{21}H_{20}N_3Br$
Molecular Weight: 394.4
CAS Number: 1239-45-8

Synonyms: Ethobromide;
Dromilac;
Homidium Bromide;
EtBr; RD 1572

Physical Data

Description: Compound may be ordered as a solid powder, tablets, or a stock solution of known concentration.
Melting Point (solid): 500° F (260° C)

Exposure Limits

Occupational exposure limits have not been established by OSHA, NIOSH, or ACGIH.

Toxicity Data

Acute Animal Toxicity

Oral; rat: LD50 = 1503 mg/kg
Inhalation; rat LC50 = 0.0118-0.1340 ppm
Subcutaneous; mouse: LD50 = 110 mg/kg
Intraperitoneal; mouse: LDLo = 20 mg/kg

Descriptive Term	LD50 wt/kg oral dose in rats	LC50 4-hr inhalation dose in rats
Extremely Toxic	≤ 1 mg	< 10 ppm
Highly Toxic	1-50 mg	10-100 ppm
Moderately Toxic	50-500 mg	100-1,000 ppm
Slightly Toxic	0.5-5 g	1,000-10,000 ppm
Practically Nontoxic	5-15 g	10,000-100,000 ppm
Relatively Harmless	≥ 15 g	> 100,000 ppm

Personal Protective Equipment (PPE)

Gloves: Wear Nitrile gloves to prevent hand contamination. Thin disposable gloves (such as 4, 6, or 8 mil blue Nitrile gloves) used in laboratory operations provide a contact barrier only and should be disposed of immediately when contamination is suspected. Disposable gloves should not be worn for protection from hazardous chemicals without double gloving because of the potential for pinholes. Latex disposable gloves are especially prone to defects and pinholes and are not recommended.

Glasses: Wear chemical safety glasses with side shields.

Lab Attire: Always wear long pants, closed toe shoes, and a lab coat when handling hazardous materials.

Health Hazard Data

Acute

- Material may be harmful by all routes of entry; inhalation, ingestion, or skin absorption.
- Material causes eye and skin irritation and is irritating to mucous membranes and upper respiratory tract.

Chronic

- This agent intercalates DNA strands and was mutagenic in a number of test systems (yeast cells).
- The chemical, physical, and toxicological properties have not been thoroughly investigated in humans.

Emergency and First Aid Procedures

In the event of any chemical exposure emergency, dial 911 to reach the Campus dispatch. The appropriate emergency response personnel (UCSC Fire Department, EH&S) will be notified and respond as soon as possible. Provide the following interim first aid measures as appropriate until help arrives.

Ingestion (Swallowing): If the person is conscious, rinse mouth with water. Do not induce vomiting. Keep affected person warm and at rest until qualified medical personnel arrive.

Inhalation (Breathing): Remove the victim from the exposure area to fresh air immediately. If breathing has stopped, have a qualified individual give artificial respiration. Keep affected person warm and at rest until medical personnel arrive.

Skin Contact. Remove contaminated clothing (including shoes) immediately. Wash the affected area of your body with soap or mild detergent and large amounts of water until no evidence of the chemical remains (at least 10 to 20 minutes). Get medical attention if you experience appreciable eye or respiratory irritation.

Eye Contact: Wash the eyes immediately with large amounts of water occasionally lifting lower and upper lids, until no evidence of chemical remains (at least 15 to 20 minutes). Remove contact lenses if they are not rinsed by eyewash. Get medical attention immediately. If you have experienced appreciable eye irritation from a splash or excessive exposure, you should be referred promptly to an ophthalmologist for evaluation.

Decontamination & Disposal Procedures

Disposal

- Dispose of all ethidium bromide waste through the campus Hazardous Waste Department. For information on proper disposal, contact EH&S at 9-2553.
- Drain disposal of ethidium bromide solutions is *NOT ALLOWED*.
- Disposal of dried gels containing ethidium bromide or any contaminated solid waste (gloves, microfuge tubes, etc.) in the general campus waste stream is *NOT ALLOWED*.
- Collection and detoxification of ethidium bromide solutions for drain disposal is *NOT ALLOWED*.

Decontamination of Spills

Previous information suggested detoxification and decontamination of ethidium bromide by oxidation with household bleach. Further research has shown that this produces compounds that are more hazardous than the original ethidium bromide compound. Therefore, *OXIDATION WITH BLEACH IS NOT AN ACCEPTABLE DESTRUCTION TECHNIQUE* and should not be used.

Method 1 (Lunn and Sansone 1989) Recommended technique for smaller, isolated spills of dilute solutions.

1. Turn off all electrical equipment before decontamination. Wear appropriate protective equipment including gloves, lab coat, and safety goggles.
2. Absorb all free liquid from the spill with paper towels.
3. **Caution:** The towels may contain levels of concentrated ethidium bromide and should be handled appropriately.
4. Scrub the contaminated surface six separate times, each time using a fresh, wet paper towel. Place all towels into a container.
5. Collect all paper towels and debris involved with the clean up and dispose as hazardous waste through EH&S.
6. Dry the equipment or surface and place into service.

Method 2 (Bensaude 1988) Recommended technique for larger, more diffuse spills.

1. Wipe up excess liquid with paper towels. Wet surface with ethanol and sprinkle activated charcoal on the surface.
2. Wipe up the charcoal/ethanol mixture with paper towels. Seal the wastes in a plastic bag and dispose of the bag through EH&S.

In some cases, decontamination of building materials is more difficult and time consuming than material removal. Contamination on vinyl floor tiles or sheetrock walls can be easily removed by removing the building material itself.

References

Bensaude, O. Ethidium Bromide and Safety- Readers Suggest Alternative Solutions. Trends Genet. 4:89; 1988.

Lunn, G.; Sansone, E.B. Decontamination of Ethidium Bromide Spills. Appl. Ind. Hyg. 4: 234-237; 1989.