Environmental Health and Safety Office
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Ethidium Bromide: Hazards and Precautions

Introduction

Ethidium Bromide (EB) is commonly used as a non-radioactive marker for identifying and visualizing nucleic acid bands in electrophoresis and in other methods of gel-based nucleic acid separation. EB is a dark red, odorless, crystalline, non-volatile solid, moderately soluble in water, which fluoresces readily with a reddish-brown color when exposed to ultraviolet light (UV). Its formula is 2, 7,-Diamino-10-ethyl-9-phenyl-phenanthridium bromide, CAS# 1239-45-8. Although it is an effective tool, its hazardous properties require special safe handling and disposal procedures. Procuring pre-prepared liquid solutions is an effective method to reduce hazards associated with handling EB powder/solid.

Major Hazards

EB is a potent mutagen. It can be absorbed through the skin and is toxic upon acute exposure. EB is irritating to the eyes, skin, mucous membranes and upper respiratory tract. Though there is no evidence of its carcinogenicity or teratogenicity in humans, its mutagenic properties are cause to regard it as a possible carcinogen and reproductive toxin. EB poses no flammability (NFPA rating = 1) or reactivity hazards. It should be stored away from strong oxidizing agents.

Safety Precautions

Pure EB should only be handled under a fume hood. Protective equipment including a lab coat, chemically resistant gloves and safety goggles (not glasses) should be worn. Nitrile gloves provide an effective barrier to short-term EB exposure. Lab workers should always wash their hands after removing gloves, even if they are sure the gloves were not punctured. EB should always be handled in the vicinity of an emergency eyewash and shower. UV-blocking eyewear should be worn whenever ultraviolet light is being used. Work should be done in a UV cabinet with shielding in place.

Emergency Exposure Procedures

Eye Contact – Using the nearest emergency eyewash, immediately flush eyes for at least 15 minutes.
Skin Contact – Immediately wash the exposed area with soap and copious amounts of cold water.
Ingestion – Seek medical attention immediately.

***After any exposure to EB, seek immediate medical evaluation.

Spill Response

For small spills the following procedures should be followed:

> UV light can be used to locate the spilled material. If the EB is powder, use wet paper towels to wipe it up and dispose of the material properly. Follow the **decontamination procedure** below. If liquid is spilled, absorb the freestanding liquid with paper towels. Dispose of the material properly. Follow the **decontamination procedure** below. After cleaning the spill recheck the area with a UV light to be sure that all of the material has been removed.

For larger spills, or if you are unsure how to address the spill, contact the Environmental Health and Safety Office at 552-0308.

Decontamination Procedure

Prepare the following **decontamination solution** just prior to its use. Wear full protective equipment (lab coat, gloves, safety goggles) when preparing and using the solution. Prepare a solution of 4.2 g of sodium nitrate ($NaNO_2$) and 20 ml of hypophosphorous acid (50%) (H_3PO_2) in 300 ml of water.

1. Wash the area with a paper towel soaked in decontamination solution. Then rinse the area five times with paper towels soaked with tap water, using a fresh towel each time.

2. Soak all the towels in decontamination solution for one hour. Then remove them, gently wring out excess solution, and dispose of as dry waste in a separate bag along with the contaminated gloves.

3. Using a UV light, check the area to ensure that all the EB has been removed. Call EH&S (552-0308) to arrange for disposal of the contaminated towels, gloves and decontamination solution.

4. If the acid might damage the contaminated surface, use a few additional rinses. Again, soak all the towels in decontamination solution for at least an hour before disposal.