Rutgers Environmental Health and Safety (REHS) Guidance Document

Title: Ethidium Bromide Waste Disposal

Revision Date: November 6, 2020

BACKGROUND

Ethidium bromide is used as a fluorescent tag in molecular biology laboratories for techniques such as agarose gel electrophoresis. It is thought to act as a mutagen because it inserts itself between the strands of DNA, thus deforming the DNA. Ethidium bromide is not regulated as a hazardous waste. However, since its toxicity to humans has not been fully studied, special waste disposal requirements have been implemented at Rutgers to err on the side of caution.

Because of the concern surrounding ethidium bromide, many alternative products are now available and being used at Rutgers laboratories. Some alternative products pose little or no danger to lab personnel while others still present a concern. For this reason, it is best to use these ethidium bromide guidelines for all products used as fluorescent tags in electrophoresis unless otherwise evaluated by REHS and deemed unwarranted.Refer to the attached flow chart for a graphical representation of these guidelines.

https://ipo.rutgers.edu/sites/default/files/Electrophorsis-SOP-2-2-09-Flow%20_2_.pdf

There are three types of waste typically generated from electrophoresis:

- Stock solutions
- Gels and contaminated non-sharp debris (e.g. gloves, pipette tips, paper towels)
- Buffer solutions (including filtration of these solutions)

NOTE: Electrophoresis wastes containing acrylamide or polyacrylamide must be managed as Hazardous Waste.

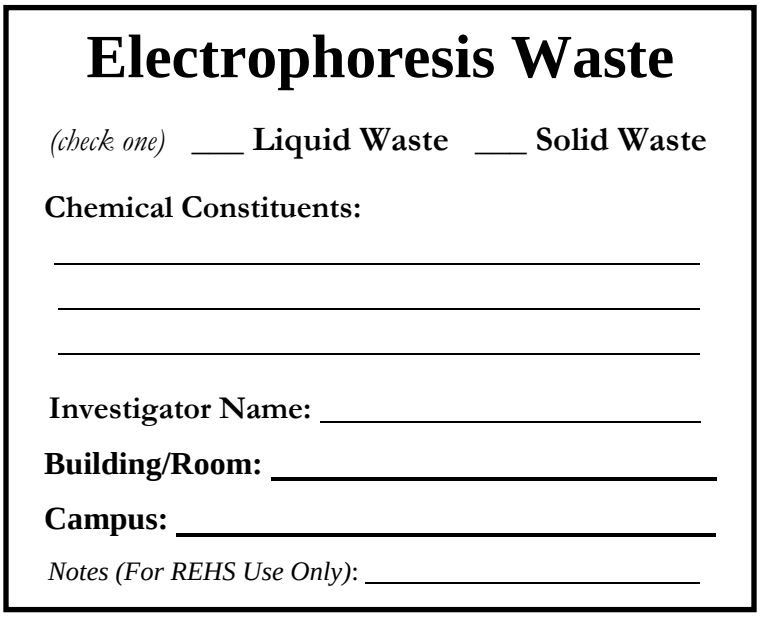
Stock Solutions (>10µg/ml Concentration)

1. Collect waste electrophoresis stock solutions in an appropriately sized container. REHS can provide 5-gallon plastic carboys upon request. Make sure the container lid is secured when not in use.

2. Label electrophoresis stock solution waste containers with the label shown in Fig. 1. Make sure the label is completely filled out.

3. Dispose of electrophoresis stock solutions through REHS by using the online Request for Hazardous Waste Disposal at https://halflife.rutgers.edu/forms/hazwaste.php.

Figure 1. Electrophoresis Waste Label



Stock Solutions (<10µg/ml Concentration)

1. Electrophoresis stock solutions containing <10µg/ml can be drain disposed.

   NOTE: Rutgers facilities such as research farms or marine research stations that have a septic system are not permitted to drain dispose any concentration of ethidium bromide stock solution. Instead, stock solutions must be collected and disposed of by REHS.

Electrophoresis Gels and Contaminated Non-Sharp Debris (e.g. gloves, pipette tips, towels)

1. Collect gels and contaminated non-sharp debris in 5-gallon screw-top pails with a clear plastic liner. Pails and liners are provided by REHS. Make sure the container lid is secured when not in use.

2. Label the pails with the Electrophoresis Waste Label shown in Fig. 1. Make sure the label is completely filled out.

3. Submit an online Request for Hazardous Waste Disposal at the following link when you are ready to dispose of the gels. REHS will provide a new pail and liner when the waste is picked up.

   https://halflife.rutgers.edu/forms/hazwaste.php

Electrophoresis Buffer Solutions and Filtration

A. Buffer Solutions (>10 µg/ml Concentration)

1. Buffer solutions containing >10 µg/ml ethidium bromide must be collected for disposal by REHS. Follow the directions for Stock Solutions >10 µg/ml.

2. Alternatively, buffer solutions >10 µg/ml can be filtered through a filtration system and the effluent drain disposed. See details below. If a spent buffer contains any constituents other than organic fluorescent dyes, do not filter the solution but rather collect it for disposal through REHS.

   NOTE: Rutgers facilities such as research farms or marine research stations that have a septic system are not permitted to drain dispose any concentration of ethidium bromide stock solution. Spent buffer solutions must be collected and disposed of by REHS.

B. Buffer Solutions (<10 µg/ml Concentration)

1. Buffer solutions containing <10 µg/ml ethidium bromide can be drain disposed.

   NOTE: Rutgers facilities such as research farms or marine research stations that have a septic system are not permitted to drain dispose any concentration of ethidium bromide stock solution. Spent buffer solutions must be collected and disposed of by REHS.

C. Filtration of Buffer Solutions

1. Filter the buffer solution through a bed or column of activated charcoal or ion exchange resin in accordance with the manufacturer's instructions. Filter kits are commercially available at many laboratory supply companies including the following:

   - VWR Life Science Destaining Bags
     https://us.vwr.com/store/product/7437707/vwr-life-science-destaining-bags

   - TaKaRa BondEX Detoxification Cartridges
     https://www.takarabio.com/products/nucleic-acid-purification/dna-cleanup-kits/bondex-ethidium-bromide-detoxification

   - MP Biomedicals™ ETBR Greenbag Disposal Kit
     https://www.fishersci.com/shop/products/mp-biomedicals-etbr-greenbag-disposal-kit-50-bags/mp112350200

   - Extractor ETBR Waste Reduction System
     https://www.thomassci.com/Laboratory-Supplies/Filtering-Funnels/_/Extractor-EtBr-Waste-Reduction-System

2. Flush the filtered solution with copious amounts of water down the laboratory sink.

3. Dispose of the used filter cartridges and/or resins in the 5-gallon pails for electrophoresis gels and solid non-sharp debris.