URANYL E-M STAINING COMPOUNDS

Standard Operating Procedure

Revision Date: 12/22/22

Laboratory Director (LD) Approval is Required Prior to Performing this Procedure

This standard operating procedure (SOP) outlines the handling and use of *uranyl E-M staining compounds*. 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 *uranyl E-M staining compounds*. All laboratory workers must read and understand the [*Laboratory Emergencies SOP*](https://ehs.umich.edu/wp-content/uploads/2022/05/LaboratoryEmergencyProceduresSOP.docx) prior to commencing any work in a laboratory.

# Description [Provide additional information as it pertains to your research protocol]

Uranyl E-M staining compounds are commonly used as a contrast agent for staining tissue for imaging via electron microscopy. These compounds bind to nucleic acids, to proteins and to membranous structures and increases contrast. Uranyl E-M staining compounds are both toxic and radioactive (alpha emitter). All solids and solutions should be labeled with a caution radioactive sticker. All waste, both liquid and solid, needs to be disposed of as radioactive waste and disposed of properly.

**Physical & Chemical Properties/Definition of Chemical Group**

* Class: Toxic & Radioactive
* Form (physical state): Solid
* Color: Yellow-green
* Odor: Slight acetic odor/characteristic

## Process [Write the steps for using the chemical in your research protocol]

# Potential Hazards [Provide additional information as it pertains to your research protocol]

* Very toxic by inhalation and if swallowed. Danger of cumulative effects.
* Target Organs:Liver, Kidneys

# Engineering Controls [Provide additional information as it pertains to your research protocol]

* All work must be performed in a fume hood while the compound is in a powder form since inhalation is the most serious route of entry. This includes making stock solutions. Once in solution, the material can be used on a bench top.

# Work Practice Controls [Provide additional information as it pertains to your research protocol]

* Mark areas where uranyl E-M staining compounds are used (benchtops, fume hoods) with radioactive warning tape. Do not work in unmarked areas.
* Work on top of absorbent paper to protect area from contamination and to contain small spills.
* Always wear a lab coat, disposable gloves, and safety glasses (or goggles) whenever handling uranyl E-M staining compounds.
* Label all bottles, tubes, flasks, etc. containing uranyl E-M staining compounds with radiation warning tape. Also mark them with the words of the specific compounds you are using (i.e Uranyl Acetate, Uranyl Formate).
* Uranyl E-M staining compound waste liquids must be collected in the radioactive liquid waste carboy. Items contaminated with uranyl E-M staining compounds solid items must be placed in the radioactive solid waste container.
* Clean the work area immediately after use:
	+ Gather and dispose, as radioactive wastes, all potentially contaminated wastes (e.g. gloves, bench paper, disposable containers, residual solutions).
	+ Gently clean work areas using paper towels dampened with soap and water.  Dry completely.
	+ Dispose of cleaning materials as radioactive wastes.
	+ Store all unused uranyl stocks and solutions in appropriate and labeled containers and keep in locked cabinets.

# Personal Protective Equipment [Provide additional information as it pertains to your research protocol]

**Hand Protection**

Nitrile gloves are recommended when working with uranyl E-M staining compounds. Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with the uranyl E-M staining compound you are using. Refer to the [glove compatibility chart](https://ehs.umich.edu/research-clinical/planning-safe-research/glove-compatibility-chart/).

**Eye Protection**

Safety glasses – ANSI Z87.1 approved

**Skin and Body Protection**

Lab coats must be worn. These laboratory coats must be appropriately sized for the individual and be buttoned to their full length. Laboratory coat sleeves must be of a sufficient length to prevent skin exposure while wearing gloves. Full length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle should not be exposed.

**Respiratory Protection**

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EHS.

Respirators should be used only under any of the following circumstances:

* As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
* When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
* There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL).
* As PPE in the event of a chemical spill clean-up process.

**Hygiene Measures**

Wash your hands immediately with warm water and soap after handling uranyl E-M staining compounds. Dispose of contaminated PPE as radioactive waste.

# Transportation and Storage [Provide additional information as it pertains to your research protocol]

* Store in cool, dry place in tightly closed container.

# Waste Disposal [Provide additional information as it pertains to your research protocol]

Uranyl E-M staining compound waste is considered radioactive waste, whether solid or liquid. Handle and store hazardous waste following the guidelines above for work practice controls, transportation and storage. 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, unless authorized by EHS Hazardous Materials Management (HMM).*** Contact EHS-HMM at (734) 763-4568 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to the EHS [Hazardous Waste](http://ehs.umich.edu/haz-waste/) Web page for more information.

# Training of Personnel

All personnel are required to complete the ***General Laboratory Safety Training*** session (**BLS025w** *or equivalent*) via the [EHS My LINC](https://ehs.umich.edu/safety-training/) Web page.

Furthermore, all personnel shall read and fully adhere to this SOP.

# Certification

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

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| Laboratory Director | Revision Date |

### Major Revisions (Tracking purposes only -- Do not print as part of SOP)

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| --- | --- |
| Date | Revision |
| 12/22/22 | Updated to current SOP format (BR) |
| 12/20/23 | Reviewed content and updated links (BR) |
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