FactSheet Uranyl Compounds

Uranyl compounds such as Uranyl Acetate and Uranyl Nitrate are composed of Uranium-238, a naturally occurring radioactive isotope (or radioisotope). Uranium-238 is primarily an alpha emitter, however, low energy beta particles and minimal gamma rays can be produced in the decay chain.

How are these uranyl compounds used at USC?

These compounds are used to stabilize nucleic acids and cell membranes in tissue samples as well as create negative stains for transmission electron microscopy (TEM).

What hazards do these compounds present?

Uranyl compounds are primarily alpha emitters. Exposure via inhalation or ingestion of these compounds will damage the lungs and bones and can potentially increase the risk of cancer. Additionally, external exposure to the low energy beta particles may cause tissue damage (minimal).

What control measures are required?

Take the following precautions when working with uranyl compounds:

- Wear appropriate PPE (e.g., lab coat, glasses, and gloves) when handling uranyl salts.
- Handle all material inside a functioning and certified fume hood.
- Minimize the amount of compound used.
- Avoid pulverization of solid material in order to prevent dust generation.
- Use secondary containment to transport samples between labs.
- Contact hazmat@usc.edu, radsafety@usc.edu, or (323) 442-2200 in the event of a spill.

Are there safer alternatives?

YES. Both platinum blue and lanthanide acetates are commercially available TEM stains that are satisfactory substitutes for uranyl acetate in many applications. Also, platinum waste streams qualify for recycle/recovery.

What I need to know...

- Substitute uranyl compounds with platinum blue or lanthanide acetates.
- Avoid generating dust when working with uranyl compounds. Inhalation or ingestion of alpha particles pose a much greater danger inside the body.
- Contact EH&S at (323) 442-2200 for waste pickup or notification of emergencies (e.g., radioactive spills).

How do I properly dispose of uranyl compounds?

- Dedicate a rad waste container exclusively for uranyl compounds. Consult Page 2 of the Radioactive Waste Disposal Fact Sheet to select the proper container for aqueous or solid media. NOTE: DO NOT enter uranyl salts into EHSA. They are exempt from usage tracking, contamination checks, and activity logging.
- Affix a hazmat label to the container and complete all fields. NOTE: This waste stream is categorized as "mixed" since the species is both a radioactive and hazardous material. Note that disposal costs for uranyl compounds are extremely high given their mixed waste status.
- Request a hazardous waste pickup online when the container is 80% filled.

Contact hazmat@usc.edu or radsafety@usc.edu if you have any questions regarding this waste stream.

References

Article - new staining reagents for TEM

Substitute for uranyl compounds

Uranyl Acetate Safety Data Sheet (SDS)

Uranyl Nitrate SDS

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