Working Safely with Uranyl Compounds

This fact sheet is designed to provide technical information for users of uranyl compounds including, but not limited to, Uranyl Acetate, and Uranyl Nitrate. **This document does not cover work with other radioactive materials!** Questions relating to the use of other radioactive materials should be directed to the Radiation Safety Officer at 412-268-8405. This reference sheet will describe the following as it relates to uranyl compounds:

- Properties
- Hazards
- Inventory Requirements
- Exposure Control
- Waste Disposal

238\(^{\text{U}}\)

**Properties**
The principal isotope in Uranyl Acetate and Uranyl Nitrate is Uranium-238. Uranium-238 is primarily an alpha emitter but low energy beta particles and minimal gamma rays can be produced in the decay chain. Typically, uranyl compounds are purchased in solid form from which liquid solutions are prepared.

**Hazards**
Given that the primary hazard of uranyl compounds is alpha particles, ingestion and inhalation are the two primary exposure routes. Damage to the lungs and bone cells as a result of exposure can result in an increased risk of cancer. Further, uranium is a heavy metal and can lead to kidney damage. Since low energy beta particles are produced, damage from external exposure is minimal.

**Inventory Requirements**
All labs using or possessing uranyl compounds must keep an accurate and up-to-date inventory in the Chemtracker Inventory Management System. For more information, please visit: [https://www.cmu.edu/ehs/chemical/chemtracker.html](https://www.cmu.edu/ehs/chemical/chemtracker.html) for more information. As a courtesy, please notify the Radiation Safety Office when uranyl compounds are purchased via email at alawson@andrew.cmu.edu
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Exposure Control
When working with uranyl compounds, the following exposure control precautions should be taken:

- Reduce the amount of compound used or use a less hazardous substitute when possible.
- Handle all powdered material inside a properly functioning and certified chemical fume hood.
- Place plastic backed absorbent paper or use a plastic food service tray to contain spills.
- Wear lab coat and chemical goggles.
- Use gloves and change gloves frequently.
- Monitor the work area, and extremities before and after use using a functioning and calibrated Geiger Mueller (GM) counter. Any measurement above 200 counts per minute (cpm) should be cleaned up immediately.
- Clean up all overt spills immediately using absorbent towels and monitor the area using a GM counter after cleanup.
- Transport of any samples should be done using a secondary container.

Shielding materials are not necessary to protect persons from uranyl compounds, due to the low energy of the beta particles emitted.

Security and Storage
Working stock and powdered solutions must be stored in a locked cabinet. Containers must be placed into secondary containment.

Waste Disposal
Follow hazardous chemical waste guidelines for disposal of liquid containers. All gloves and contaminated dry materials should be placed into a heavy plastic bag and properly labeled when full. For more information, please visit: [http://www.cmu.edu/ehs/waste-environment/hazardous-waste/](http://www.cmu.edu/ehs/waste-environment/hazardous-waste/)

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