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1.0 Introduction

1.1 Purpose

- The document establishes guidance for safely weighing hazardous powders.

1.2 Scope

- This document applies to all personnel that weigh hazardous powders at Emory University and Emory Healthcare.

1.3 Responsibilities

Environmental Health and Safety Office (EHSO)

The Environmental Health and Safety Office (EHSO) serves as an advocate for safety and health at Emory University. EHSO assists with the identification of hazardous powders, the development and implementation of procedures for Particularly Hazardous Substances (including powder forms) and provides guidance to laboratory personnel regarding safe laboratory practices for weighing hazardous powders.

Principal Investigators (PIs)

Principal Investigators (PIs) are responsible for laboratory personnel (Lab Managers, Staff and Students). Their responsibilities include (but are not limited to):

- Identifying hazardous powders and considering substitutions for less hazardous material.
- Providing the necessary training for each individual based on lab specific requirements including each research project or experiment that he/she will weigh hazardous powders.
- Implementing required provisions for Particularly Hazardous Substances (select carcinogens, reproductive toxins, and chemicals with a high degree of acute toxicity).
- Ensuring that laboratory personnel complete all required safety training and remain current with refresher training requirements.
- Ensuring that laboratory personnel review and understand the hazards and procedures for working with hazardous powders.

Laboratory Staff, Students, and Registered Non-Emory Affiliates

All individuals who participate in research activities and use hazardous powders have responsibilities that include (but are not limited to):

- Reading and understanding the Safety Data Sheet (SDS) content for each hazardous powder that is to be used for their work.
- Reviewing and understanding the procedures for working with Particularly Hazardous Substances, to include the powder forms.
- Completing all required safety training and remaining current with refresher training requirements.

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1.4 Definitions

Particularly Hazardous Substances. Select carcinogens, reproductive toxins, and chemicals with a high degree of acute toxicity.

Solute. A substance that is dissolved in a solution.

Solvent. A substance, ordinarily a liquid, in which other materials dissolve to form a solution.

2.0 Hazard Identification

Hazardous powders may be potentially associated with both health and physical hazards. Health hazards may include sensitization, irritation, toxicity, and carcinogenicity. Physical hazards may be from self-heating, shock sensitivity, or ignition in contact with air. Refer to the Safety Data Sheets and product labels for specific health and physical hazard information.

3.0 Procedures

The following best practices must be considered when working with hazardous powders.

3.1 Purchasing

- When possible, purchase the chemical in a pre-mixed liquid solution to avoid handling hazardous powders.
- Purchase hazardous powders in pre-weighed volumes and/or sealed vials with a septum that allows solvent to be added directly to the container.
- Purchase the smallest quantity of hazardous powder required to complete the work.

3.2 Weighing

- Designate and clearly mark a specific location within the lab where hazardous powders are used (e.g., hazardous powder work zone).
- Never handle toxic powders near desks or computer workstations.
- Avoid high traffic areas (e.g., along aisles or near doors, etc.)
- Use disposable items (e.g., spatulas, weigh paper, etc.) and immediately discard after use.
- When possible, weigh hazardous powders in a chemical fume hood.
 - Place an empty container with a lid on the balance and press tare (the mass should read zero).
 - Take the container to the chemical fume hood, add the powder to the container and close the lid.

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- Go to the balance and re-weigh the container; the difference will be the powder weight.
- Return to the chemical fume hood for weight corrections or manipulations.
- Remember to only handle the powder while inside the chemical fume hood and keep the lid closed between weighing and adding/removing the powder.
- If airflow or vibration issues are prohibitive (such as when using an analytical scale), consider the following alternatives:
 - Tare Method (**EHSO preferred method**, described in Section 3.3)
 - Use alternative ventilation controls:
 - HEPA-filtered ventilated balance enclosure (Appendix A, Figure 1)
 - Glove bag (Appendix A, Figure 2)
 - Glove box (Appendix A, Figure 3)
 - Enclosed balance (Appendix A, Figure 4)

3.3 Tare Method

- Documenting Initial Receipt - Following removal of the tamper-proof seal (as applicable) and prior to opening the container for the first time, determine the total weight of the container, including lid/cap and contents. On the first line of the applicable form, make an entry that states:
 1. the date;
 2. the total weight of container, lid/cap and contents in milligrams (mg);
 3. the signature/initials of person making the entry; and
 4. in the balance column, record the weight of substance contained in the full container as stated on the manufacturer's label.

**If the receiving quantity is unknown or not verifiable, contact ORIC for additional guidance.*

- Dispensing Powdered Substances - The following is the recommended method to dispense powdered substances to prevent substance loss and reduce risk of exposure:
 - Prior to opening the container, weigh the container, lid/cap and contents, and confirm the weight matches the previously recorded value on the applicable use log/form.
 - Remove the lid/cap from the container and place the container containing the powder on an electronic balance and tare the balance.
 - Remove the powder until the electronic balance indicates that the required amount has been removed.
 - Make an entry on the applicable forms/records entering the "quantity withdrawn".
 - Replace the lid/cap and verify the updated weight of the container, lid/cap and

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contents. This value should be the initial receipt weight minus the total amount of powder dispensed/removed to date.

3.4 Electrostatic Charging

- Electrostatic charging of equipment (e.g., plastic tare vessels) is common and can cause powders to be scattered over a large area.
- Minimize aerosolization of hazardous powders by using anti-static weigh vessels or [anti-static bars or guns](#).

4.0 Personal Protective Equipment (PPE)

- Minimally, closed toe shoes, long pants/skirts, lab coats/gowns, ANSI (Z87.1) approved eye protection, and task appropriate gloves must be worn.
- If the chemical is labeled with the code H310, “fatal in contact with skin,” wear two pairs of gloves.
- Where there is potential for splashing or the production of aerosols, splash goggles must be worn.
- After weighing powders, remove gloves, dispose of them in a solid chemical waste container (available from EHSO), and wash hands immediately.

5.0 Decontamination

- Work areas and non-disposable items/equipment should be cleaned after each use of the hazardous powder. Place used tools in a container filled with a solvent capable of dissolving the hazardous powder (solute). Use a solvent filled squirt bottle to wet equipment and work surfaces and then wipe clean with paper towels. Dispose of the paper towels in a solid chemical waste container (available from EHSO).
- Brushes should not be used to clean balances or other hard surfaces as this will generate powdered aerosols (i.e., dust).

6.0 References

- [EHS-405 Chemical Hygiene Plan](#)
- [NIH Policy Manual](#)
- [Weill Cornell EHS Toxic Powder Weighing](#)
- [University of Wisconsin-Madison EHS Weighing Hazardous Powders](#)
- [Labconco Xpert Balance Enclosures](#)
- [Erlab Captair Weighing Stations](#)
- [Labs-USA Powder Weighing Fume Hood](#)
- [Cole-Parmer Glove Bag/Inflatable Glove Chamber](#)
- [Cole-Parmer Economical Glove Box](#)



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- [Plas-Labs Compact Glove Boxes/Balance Chambers](#)
- [Sigma Aldrich Dry-box Glove Assembly](#)
- [Mettler Toledo Standard ME Analytical Lab Balance](#)

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Appendix A: Examples of Alternative Ventilation Controls



Figure 1. HEPA Filtered Balance Enclosure



Figure 2. Glove bag



Figure 3. Glove box



Figure 4. Enclosed analytical balance