DS Fact Sheet on **Particularly Hazardous Substances (PHS)**

National Institutes of Health (NIH) • Office of Research Services (ORS) • Division of Safety (DS)

What is a Particularly Hazardous Substance?

The OSHA Laboratory Standard classifies a set of chemicals as Particularly Hazardous Substances (PHS) due to certain health hazards they have. These include select carcinogens, reproductive toxins, and substances that have a high degree of acute toxicity. Refer to the NIH Chemical Hygiene Plan (CHP) for guidance on identifying and safely working with Particularly Hazardous Substances.

This fact sheet provides guidance on:

Category	Definition and Resources
Select Carcinogen 	• Any substance that meets one of the following criteria: - Regulated by OSHA as a carcinogen: https://www.cdc.gov/niosh/npg/nengapdxb.html - Listed under the category "Known to be carcinogens" in the 15th Report on Carcinogens published by the National Toxicology Program (NTP) - Agents Classified by the IARC Monographs, Volumes 1–137, IARC Monographs on the Identification of Carcinogenic Hazards to Humans (who.int) ➢ American Cancer Society (ACS) has compiled the above-mentioned lists into one on its website: Known and Probable Human Carcinogens ➢ Safety Data Sheet (SDS) Section 2 for specific hazards
Reproductive Toxin 	• Agents that can have adverse effects on various aspects of reproduction: fetal development (teratogens), chromosomal damage (mutagens), fertility, gestation, lactation, and sterility. • Reproductive toxins can affect both men and women ➢ Safety Data Sheet (SDS) Section 2 for specific hazards
Acute Toxin 	• OSHA doesn't provide any clear guidance on this category. Chemicals with high acute toxicity are those having oral, inhalation, or dermal LD50 and LC50 values below a specified threshold. The threshold values: - Oral LD50 (rats): < 50 mg/k - Dermal LD50 (rabbits): < 200 mg/kg - Inhalation LC50 (rats): < 200 ppm in air ➢ Safety Data Sheet (SDS) Section 11 for Toxicological Information (LD50 and LC50 values) and Section 2 for specific hazards ➢ Registry of Toxic Effects of Chemical Substances (RTECS) is also a good source of information on acute toxins

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Requirements for Working with PHS

1. **Develop Standard Operating Procedures (SOP)**
   - PI is responsible for developing the SOPs using the templates available at PHS SOP Template Table
2. **Establish a "Designated Area" and use only that area for work and storage**
   - All laboratories working with PHS must establish a "designated area." This area could be an entire laboratory, a defined area within a laboratory, or a device or piece of equipment. Mark the area with the DS approved PHS Designated Area sign.
3. **Document Training**

   Employees who either handle or who may be exposed to PHS must complete the following trainings:
   - Introduction to Lab Safety – Online Training (Lab Safety training)
   - Review of the SOPs and SDSs and the NIH guidelines on the use of PHS: NIH Chemical Hygiene Plan, Appendix B
   - PI provided training on lab-specific procedures, emergency response, exposure control (engineering, administrative and PPE), signs and symptoms of exposure, and decontamination/disposal procedures.
4. **Use Exposure Controls**
   - Engineering controls (e.g., chemical fume hood (CFH), downdraft table, or the equivalent) and appropriate PPE (at a minimum, safety glasses with side shield, laboratory coat, and nitrile gloves) are required for work involving PHS. Refer to NIH Chemical Hygiene Plan, Appendix F for guidance on PPE selection. If you need assistance in performing hazard assessment and identifying controls, contact your IC Safety and Health Specialist.
5. **Establish Decontamination Procedures**
   - Decontamination procedures include wiping down work surfaces at the end of the day and cleaning up drips, residues, and spills. Cleanup materials used (e.g., absorbents and rags) must be disposed of as hazardous waste.

Weighing PHS Powders

All PHS powders must be handled inside a CFH. Placing a balance directly inside the CFH works for some situations, depending on the required accuracy of the experiment and the material's properties. If the air flow in the CFH is too high, it can sometimes cause the powder to become airborne and spread the material over all the surfaces. Some balances have enclosures that can mitigate this problem.

If you can't weigh the powder inside a CFH, do the following, in this order:

1. Purchase ready-made solutions of the chemicals, if available.
2. Purchase pre-weighed quantities, if possible, in containers with a septum attached to inject the diluent without opening the container.
3. Weigh on a benchtop balance by following the below steps:
   - Pre-weigh a vial with a lid.

- Take it to the fume hood and add the powder to the vial.
- Take the closed vial back to the balance and re-weigh. It may take few attempts to get the desired amount.
- Once you have the required amount weighed out make the solution inside the CFH.

Storage

Store PHS with secondary containment in a designated area away from any incompatible chemicals. All containers including the secondary containment must have appropriate GHS labels with pictograms and the signal word "Danger." Attach PHS Designated Area sign to the secondary containment and the storage area. Store Flammable PHS inside a flammable storage cabinet in a designated area.

Waste Collection and Disposal

- Accumulate waste in a sturdy, chemically compatible container, with a secure closure.
- Contaminated debris (e.g., pipette tips, absorbent paper, etc.) should be placed in a clear plastic bag (NSN-8105-01-195-8730):
  - Close the plastic bag with a filament tape or bag closure tie and place bag in a plain carboard box or double bag the dry waste.
  - Complete and attach a Chemical waste tag (NSN # 753000L075985).
- All waste containers must be properly closed or sealed. Refer to NIH Waste Disposal Guide for additional information.

Emergency Response

For medical help and Spills – **All** Spills involving PHS are **High-level hazard spills.**	Contact the Fire Department: Bethesda, MD – call 911 on-campus, 9-911 off-campus, (301) 496-9911 (cell phone) Baltimore, MD – 911 (cell phone), 9-911 (landline) Frederick, MD – 911 Hamilton, MT – 911 Research Triangle Park, NC - 911 (landline), (919) 541-2800 (cell phone)
For dermal & eye exposure – Wash immediately under eyewash or safety shower, as appropriate, for at least 15 minutes.	Seek medical attention if needed, as described above. The injury should be immediately reported to your local OMS clinic: Bethesda, MD – Building 10, Room 6C306: (301) 496-4411 Baltimore, MD – 251 Bayview Blvd., BRC 01B210: (667) 312-5843 Frederick, MD – 8200 Research Plaza, Room 1B116: (301) 631-7233 Hamilton, MT – 903 South 4th Street, Room 5204: (406) 375-9755 Research Triangle Park, NC – 111 T W Alexander Drive, Building 101, Room E111: (984) 287-4178