

Title of SOP: General Use SOP for Highly Reactive/Unstable Materials		
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PURPOSE:

This standard operating procedure (SOP) is intended to provide general guidance on how to safely work with highly reactive/unstable materials. This SOP is generic in nature and only addresses safety issues pertaining to reactivity/stability hazards of chemicals. In some instances, several general use SOPs may be applicable for a specific chemical (i.e., for perchloric acid, both general use SOPs for highly reactive/ unstable materials and corrosives would apply). If you have questions concerning the applicability of any item listed in this procedure contact the Principal Investigator/Laboratory Supervisor of your laboratory or Environmental Health and Safety (x5-4312).

SCOPE:

Highly reactive or unstable materials are those that have the potential to vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, temperature, light, or contact with another material. Major types of highly reactive chemicals are explosives, peroxides, water-reactives, and pyrophorics.

APPLICABILITY:

Control of Hazards- General:

- Minimize the quantity of reactive chemicals used or synthesized to the smallest amount needed.
- Handle reactive chemicals with caution. Appropriate chemical-specific precautions must be taken for mixing even small quantities with other chemicals.
- Chemical reactions conducted at temperatures or pressures above or below ambient conditions must be performed in a manner that minimizes risk of explosion or vigorous reaction.
- Provide a mechanism for adequate temperature control and heat dissipation.
- Utilize shields and barricades, and personal protective equipment (such as face shields with throat protectors and heavy gloves) whenever there is a possibility of explosion or vigorous chemical reaction.
- Glass equipment operated under vacuum or pressure must be shielded, wrapped with tape, or otherwise protected from shattering.

PROCEDURE:

Engineering/Ventilation Controls:

As many reactive materials liberate combustible and/or toxic gas when exposed to water vapor or air, they should be used in a lab hood to prevent hazardous buildup of gases.

If the process does not permit the handling of such materials in a fume hood, contact Environmental Health and Safety at x5-4312 to review the adequacy of alternative ventilation measures.

Personal Protective Equipment:

At minimum, safety glasses, lab coat, long pants, and closed toed shoes are to be worn when entering laboratories having hazardous chemicals. Additionally:

- Utilize shields and barricades, and personal protective equipment (such as face shields with throat protectors and heavy gloves) whenever there is a possibility of explosion or vigorous chemical reaction.
- When handling hazardous chemicals or contacting potentially contaminated surfaces, protective gloves are to be worn. For proper selection of glove material, review [chemical MSDS](#) and [glove selection guidance](#).
- Goggles (not safety glasses) are appropriate for processes where splash or spray is foreseeable.
- For hazardous chemicals that are toxic via skin contact/ absorption, additional protective clothing (i.e., faceshield, apron, oversleeves) is appropriate where chemical contact with body/skin is foreseeable

Special Handling Procedures and Storage Requirements:

Ensure careful handling of handling materials that may be sensitive to shock, heat, friction, or light.

Ensure secondary containment and segregation of incompatible chemicals per guidance within the [PSU Chemical Hygiene Plan](#). Also, follow any substance-specific storage guidance provided in MSDS documentation.

Label all chemicals with date received and date opened and if an appropriate expiration date does not exist, assign one as provided within PSU SOP on Peroxide Forming Chemicals (link coming soon).

Any chemicals with crystallization, visible discoloration, or liquid stratification potentially have undergone peroxidation and must not be used or otherwise disturbed.

Spill and Accident Procedures:

Prompt response to chemical spills is critical to protect worker health & safety and to mitigate adverse affects to the environment. For further guidance, refer to "[Response to Chemical Spills and Exposures](#)".

Laboratory personnel who work with hazardous chemicals are to be provided the opportunity to receive medical attention/consultation when:

- A spill, leak, explosion or other occurrence results in a hazardous exposure (potential overexposure).
- Symptoms or signs of exposure to a hazardous chemical develop.

Waste Disposal:

Many reactive/ unstable materials intended for disposal may likely be considered hazardous wastes. For general guidance regarding waste disposal, refer to: <https://www.pdx.edu/environmental-health-safety/waste-management>

Minimum Training Requirements:

- Chemical Safety for Laboratories
- Laboratory-specific training

Approval Required:

Consult with PI regarding need for prior approval. Laboratory personnel shall seek and the PI must provide prior approval of any chemical usage involving the following list of [restricted chemicals](#).

Decontamination Procedures:

Personnel: If immediate medical attention is required, call 911. Remove any contaminated clothing, and IMMEDIATELY flush contaminated skin with water for at least 15 minutes following any skin contact. For eye exposures, IMMEDIATELY flush eyes with water for at least 15 minutes.

Consult MSDS for guidance on appropriate first aid. Where medical attention is required, ensure to bring along MSDS(s) of chemical(s) to aid medical staff in proper diagnosis and treatment.

Area: Decontamination procedures vary depending on the material being handled. The toxicity of some materials can be neutralized with other reagents. All surfaces should be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated should be treated as a hazardous waste.

Designated Area:

For highly reactive/unstable materials that are also considered particularly hazardous substances, a designated area shall be established per other applicable SOPs.

ATTACHMENTS:

[Glove Selection Guide](#)

[Chemical Hygiene Plan](#)

[Restricted Chemicals](#)