Syracuse University

Laboratory Guidance Document

Water Reactive

This Laboratory Guidance Document was created by Syracuse University Environmental Health & Safety Services (EHSS) to assist researchers in developing laboratory specific standard operating procedures for the storage, handling, and disposal of water reactive materials.

Potential Hazards

The main hazard of working with water reactive material is fire upon contact with moisture.

- Water reactive materials give off flammable and/or toxic gases when they come into contact with water.
- The reaction of a water reactive and water is exothermic and can result in the formed flammable gas to ignite.

General Precautions:

Working with any water reactive material requires thorough planning and the consistent application of good work practices and skills to control the hazard while achieving the goal of the experiment.

1. **Training.**

   The Principal Investigator is responsible for ensuring all personnel under their supervision are made aware of hazards of water reactive materials, have received the appropriate hands-on training, adhere to the laboratory standard operating procedures, and are provided with the appropriate personal protective equipment.

2. **Work under the buddy system**

   Water reactive materials should never be handled while working alone. At least one additional person trained in the safe handling of water reactive materials should be present in the general vicinity of the work area while the water reactive material is used.

3. **Handle only under an inert atmosphere.**

   Never expose a water reactive material to water. Handle solid water reactive materials inside a glove box flooded with inert gas (e.g., nitrogen). Liquid water reactive materials may be handled inside a fume hood using the air-sensitive materials transfer techniques described in the Aldrich Technical Bulletins AL-134.

Personal Protective Equipment (PPE):

In addition to the standard laboratory attire (i.e., long pants and closed toe shoes), the following PPE is recommended:

- ANSI certified (Z87) chemical splash goggles

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- Knee-length lab coat

  NOTE: A flame resistant (FR) lab coats should be worn when working with a chemical that is water reactive.
- Nitrile gloves

Best Practices for the Working with Water Reactives

- Review the Safety Data Sheet (SDS), laboratory standard operating procedure (SOP), and emergency procedures before starting any work requiring water reactive materials.
- Post a hazard warning sign in all storage and use areas.
- Design a quenching scheme for residual materials. Never use water to quench the material itself or a reaction where a water reactive material is used.
- Oven-dry all glassware and transfer devices to eliminate moisture.
- Work away from water sources or areas where there is the potential for a water splash.
- Design your experiment to use the least amount of material possible to achieve the desired result.
- Secure containers to avoid tip overs and spills. Clamp the container and receiving vessel in order to leave both hands free.
- When transferring water reactive liquids inside a fume hood, ensure that the entire transfer system is airtight and under slight positive pressure of inert gas.
- Keep a beaker of dry sand within arm's length to extinguish any small fires that occur.
- Inspect all glassware and transfer devices for leaks.
- Experiments that require the use of a water reactive should be done using the smallest amount practical.
- Use a needle and syringe to transfer small volumes (<10mL). Select a syringe that will hold twice the volume that is to be transferred (i.e., use a 20mL syringe to transfer 10mL). To ensure a leak-free connection, use only Luer-locking devices.
- Use a cannula (double-tipped needle) to transfer large volumes (>10mL).
- Purge all glassware and syringes/cannula multiple times with inert gas prior to use.
- Quench any residual material in the needle and syringe, never return excess material to the original container.
- Solid water reactives should be handled in a glove box under an inert atmosphere.

Storage Considerations:

- Store liquid water reactives under dry inert gas (Nitrogen or Argon).
- Never allow product to get in contact with water or water-based compounds during storage. Keep in a dry place (such as a desiccator or a dry box or glove box) free of moisture/humidity and away from sources of heat.
- Do not leave the container near a lab sink, emergency eyewash, or safety shower or on the bench top.
- Ensure that a sufficient protective solvent, oil, kerosene, or inert gas remains in the container while the material is stored.

Disposal:

- Water reactives should be quenched according to a laboratory's standard operating procedure.
- Disposal of large amounts of water reactives should be disposed of by EHSS.

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First Aid:

The chemical's SDS should be readily available and used as a reference for determining appropriate first aid measures. The following information provides typical first aid measures recommended for chemical exposures.

1. **Skin Contact:** Remove all contaminated clothing and rinse affected area with water for at least 15 minutes.
2. **Eye Contact:** Flush with water at an emergency eyewash station for at least 15 minutes.
3. **Ingestion:** Seek medical attention immediately.
4. **Inhalation:** Move to fresh air and seek medical attention immediately.

Incident Response:

All laboratory emergencies must be reported to the Department of Public Safety at 315-443-2224.

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