

Water Reactive Chemicals Overview



The information presented in this overview is intended to provide general guidance regarding the hazards associated with water reactive chemicals. It is not intended to be a specific procedure for your laboratory. Specific written procedures are the responsibility of the Principal Investigator. If you have any questions concerning the applicability of any item listed in this procedure, contact Risk Management & Safety (RMS) at 334-740-9711, or the Principal Investigator of your laboratory.

Water reactive substances are dangerous when wet because they undergo a chemical reaction with water. This reaction may release a gas that is either flammable or presents a toxicity hazard. In addition, the heat generated when water comes in contact with such a material is often enough for the material to spontaneously combust or explode. The most common water reactive chemicals include sodium, potassium, lithium metals and aluminum alkyls.

Hazard Assessment

Hazard assessment of work involving water reactive chemicals should address proper use and handling techniques, fire safety (including the need for Class D fire extinguishers), storage, water reactivity, and waste disposal. Not all risks can be eliminated from work with hazardous chemicals, but a thorough hazard assessment will help in mitigating the risks. Do not begin work with a water reactive chemical unless you have been adequately trained in the proper handling and emergency procedures.

Protective Apparel

Lab coats, closed toed shoes, and long sleeved clothing should be worn when handling water reactive chemicals. Additional protective clothing should be worn if the possibility of skin contact is likely. A long-sleeved fire-resistant laboratory coat, which is properly buttoned or closed, should be worn at all times when working with pyrophoric chemicals. Shorts and open-toed shoes are inappropriate laboratory attire when working with water reactive chemicals and/or any other hazardous chemicals.

- Gloves should be worn when handling water reactive chemicals. Disposable nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. Lab workers should contact RMS, the glove manufacturer or the [glove chart](#) for advice on glove suitability or selection.
- Researchers should assess the risks associated with an experiment and use the appropriate level of eye protection. Safety glasses with side shields provide the minimum protection

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acceptable for regular use. Chemical splash goggles or face shields should be worn when there is a risk of splashing hazardous materials.

Emergency Procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure should be developed. The complete Emergency and Spill Response Procedures can be found [here](#), however the laboratory procedures should address as a minimum the following:

- Who to Contact - (911, RMS, and the Principal investigator of the laboratory including evening phone number)
- The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
 - For more information on Safety Showers and Eyewashes, click [here](#).
- The method used to alert personnel in nearby areas of potential hazards
- Special spill control materials required by the type of water reactive chemicals handled in the laboratory

Vacuum Protection

Evacuated glassware can implode and eject flying glass and splattered chemicals. Vacuum work involving water reactive chemicals must be conducted in a fume hood, glove box, or isolated in an acceptable manner.

Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood. Vacuum pumps should be rated for use with pyrophoric chemicals.

Fume Hood

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Many water reactive chemicals will liberate hydrogen when they react with water. The use of a fume hood is recommended to prevent the buildup of combustible gases. Fume hood baffling should only be adjusted by qualified personnel.

Glove boxes may be used to handle water reactive chemicals if inert or dry atmospheres are required.

Always attempt to handle water reactive chemicals in a fume hood or glove box. If your research does not permit the handling of water reactive chemicals in a fume hood or glove box, you must contact RMS to review the adequacy of all special ventilation.

Safety Shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of water reactive chemicals which pose this risk should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.

Labels

Containers: All water reactive chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable. Labels can be found here: <https://cws.auburn.edu/rms/pm/chemguidestools>

Special Storage

Water reactive chemicals should be stored in a cool and dry location. Keep water reactive chemicals segregated from all other chemicals in the laboratory. Minimize the quantities of water reactive chemicals stored in the laboratory.

Date all containers upon receipt. Potassium will form peroxides and superoxides when stored under oil at room temperature. Examine storage containers frequently. Contact RMS at 844-4870 to dispose of any container that exhibits salt build up on its exterior. Dispose of all water reactive chemicals whenever they are no longer required for current research.

Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container which may cause a fire or explosion.