WATER REACTIVE CHEMICALS
STANDARD OPERATING PROCEDURE

Water reactive chemicals are chemicals that react vigorously with moisture.
The most common water sensitive chemicals include sodium, potassium, lithium metals and aluminum alkyls. A list of some water reactive chemicals is at the end of this SOP.

HAZARD DESCRIPTION

- Water reactive chemicals can react explosively when they come into contact with water.

PROTECTION PROCESS

- Good laboratory technique
- Appropriate shielding through use of personal protective equipment
- Portable Lexan shield or fume hood with a working sash
- Availability of eye wash station and safety shower

PERSONAL PROTECTIVE EQUIPMENT

- Safety glasses/goggles (Wear chemical safety goggles when using small quantities or safety glasses or chemical safety goggles with face shield when using large quantities or when a splash potential exists.)
- Gloves should be worn when handling water reactive chemicals. Disposable latex or nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. Lab workers should contact OEHS for advice on chemical resistant gloves when direct or prolonged contact with hazardous chemicals is anticipated.
- 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.

ENGINEERING/VENTILATION CONTROLS

- Many water sensitive chemicals will liberate hydrogen when they react with water. The use of a fume hood is recommended to prevent the buildup of combustible gases.
- A glove box may be used to handle water sensitive chemicals when a dry atmosphere is required.
- A safety shower and eyewash must be available and accessible when working with water reactive chemicals.

SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

- Special ventilation is required if these materials are used outside of a fume hood. If your research does not permit the handing of water sensitive chemicals in a fume hood you must contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.
- Water sensitive chemicals should be stored in a cool and dry location. Some materials may react with excessive humidity in the air.
- Keep water sensitive chemicals segregated from all other chemicals in the laboratory.

- Minimize the quantities of water sensitive 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.
- Dispose of any container that exhibits salt build up on its exterior.
- Dispose of all water sensitive 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.

SPILL AND ACCIDENT PROCEDURES

- Before beginning work with water reactive chemicals, develop emergency procedures which address response actions to accidental exposure from fires, explosions, or spills. The procedures should address as a minimum the following:
  - Who to contact: (University police, and the Department of Occupational Health and Safety,
  - Principal investigator of the laboratory including evening phone number)
  - The location of all water reactive chemicals in the laboratory.
  - The method used to alert personnel in nearby areas of potential hazards
  - Special first aid treatment required by the type of water reactive chemical(s) handled in the laboratory
- Anticipate spills by having clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any water reactive chemicals.
- A class D fire extinguisher should be available for small fires.
- Do not put water on the spill.
- Spill control materials for water sensitive chemicals are designed to be inert and will not react with the reagent.
- In the event of a spill, all personnel in the area should be alerted.
- Do not attempt to handle a large spill of water reactive chemicals. Turn off all ignition sources and vacate the laboratory immediately and call for assistance (Department of Occupational Health & Safety 934-2487 or UAB Police 911).
- Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

WASTE DISPOSAL

- All materials contaminated with water sensitive chemicals should be disposed of as hazardous waste.
- Alert Occupational Health and Safety if you generate wastes contaminated by water sensitive chemicals.
- These wastes should not remain in the laboratory overnight as they may pose a flammability risk.

SPECIAL APPROVAL REQUIRED

- Quantities over 500 grams require notification of OH&S

DECONTAMINATION

Personnel:

- Wash hands and arms with soap and water immediately after handling water sensitive materials.

Area:

- Carefully clean work area after use.

DESIGNATED AREA

- Depends on quantity and/or process.

EXAMPLES OF WATER REACTIVE CHEMICALS

- Alkali metals, such as Na, Li, K
- Alkali metal hydrides, such as LiH, CaH_2, $LiAlH_4$, $NaBH_4$, alkali metal amides, such as $NaNH_2$
- Metal alkyls, such as lithium and aluminum alkyls
- Grignard reagents, RMgX
- Halides of nonmetals, such as BCl_3, BF_3, PCl_3, PCl_5, $SiCl_4$, S_2Cl_2
- Inorganic acid halides, such as $POCl_3$, $SOCl_2$, SO_2Cl_2
- Anhydrous metal halides, such as $AlCl_3$, $TiCl_4$, $ZrCl_4$, $SnCl_4$
- Phosphorus pentoxide
- Calcium carbide
- Organic acid halides and anhydrides of low molecular weight, such as, acetyl chloride acetic acid anhydride