**Flammable Solids, Spontaneously Combustible, and Dangerous When Wet**

1. **Process**
   1. Transporting, handling, and storing DOT class 4 materials, Flammable Solids, Spontaneously Combustible materials, Dangerous When Wet materials.
2. **Describe process, hazardous chemical, or hazard class**
   1. Flammable solids (e.g. activated charcoal, sodium dodecyl sulfate (solid)).
   2. Spontaneously Combustible (e.g. tert-butyl lithium, white phosphorous)
   3. Dangerous When Wet (e.g. Sodium metal, Potassium metal)
3. **Potential Hazards**
   1. The main hazard with these materials is fire.
   2. Due to the reactive nature of spontaneously combustible and dangerous when wet materials it is likely that they present other hazards as well. Carefully study the chemical safety information for each material prior to use.
   3. Dangerous when wet chemicals are highly reactive with water. Water will not extinguish a fire containing these materials, it will enhance combustion.
4. **Personal Protective Equipment**
   1. Consult SDS for compatible PPE.
   2. Wear safety goggles, and nitrile, PVC, or neoprene gloves.
   3. If there is a possibility of fire, leather fire resistant gloves should also be considered for some processes. The balance between dexterity loss and fire protection safety should be considered.
   4. Wear safety glasses or chemical splash goggles with face shield when using large quantities of material.
   5. A 100% cotton lab coat is a requirement for working with spontaneously combustible and dangerous when wet chemicals. Synthetic clothing should be avoided.
   6. A fire extinguisher that is compatible with the chemical in use must be close at hand and in service. Any user of class 4 chemicals must be familiar with the operation of a fire extinguisher.

1. **Engineering Controls**
   1. All chemicals in these three classes should be protected from sparks and other sources of ignition.
   2. Highly reactive materials should be used under an alternative unreactive atmosphere either using a glove box or other techniques if a glove box is not available or practical. Argon is typically preferable due to its heavy vapor density, though it is more expensive than nitrogen.
2. **Special Handling Procedures and Storage Requirements**
   1. Flammable solids do not typically require special handling other than the avoidance of sparks and other sources of ignition.
   2. Spontaneously combustible chemicals require very special handling. The first several times using these chemicals should be accompanied by an experienced chemist who has used these materials many times before. All equipment should be extremely dry (oven baked).
      1. Transfers of spontaneously combustible materials should be done ideally in a glove box or a glove bag under an atmosphere of nitrogen or argon.
      2. Where the use of a glove box is not possible or practical, liquids should be transferred ONLY by using a glass syringe with protection to prevent the accidental removal of the plunger. The syringe should be baked in a desiccating oven to ensure that it is dry prior to use. The needle should be made of steel and connect to the front of the glass syringe using a luer lock. Do not use disposable needles with spontaneously combustible liquids.
      3. Both the container containing the spontaneously combustible liquid and the container that will receive it should be closed with rubber septa and flushed with inert gas. A balloon of gas (via disposable needle) should be inserted in each septum to ensure a steady supply of inert gas to both containers.
      4. Transfer of spontaneously combustible liquids should take place quickly and efficiently. Don’t rush moving the syringe from one container to the other, but do it as efficiently as possible to minimize time of exposure to air of the material at the very end of the syringe needle.
   3. Dangerous when wet chemicals require special handling. These materials should be protected from any contact with moisture, which includes direct contact with skin as well as droplets of perspiration. Most of these materials are stored either in mineral oil or under a blanket of argon to prevent contact and reaction with oxygen.
3. **Storage**
   1. Pay careful attention to the special requirements for the individual chemical. This should be clearly laid out in the chemical safety information.
   2. Flammable solids can be safely stored in a flammable cabinet along with flammable and combustible liquids.
   3. Spontaneously combustible and dangerous when wet chemicals should be stored by themselves in a secure location. These materials should not be mixed with other flammables in the event of container breakage or some other accident.
4. **Spill and Accident Procedures**
   1. Prepare for the possibility of an accident ahead of time. If working with highly reactive materials, do not have flammable solvents in the work area to minimize the danger in the event of an accident. Consult SDS BEFORE use.
   2. Skin and/or eye exposure, inhalation or ingestion: Consult SDS/call Poison Control, inform supervisor immediately, get immediate medical attention. Dial 911 for medical transport.
   3. Spills:
      1. Incidental spills: clean up using knowledge from SDS.
      2. Small spills: Do not attempt cleanup if you feel unsure of your ability to do so or if you perceive the risk to be greater than normal laboratory operations. Call 911 for spill response.
      3. Large Spills: Notify others in area of spill. Turn off ignition sources in area. Evacuate area and post “DO NOT ENTER” signs on entrance ways to spill area. Call NAU Police at 911 for spill response. Restrict personnel from area of spill or leak until cleanup is complete. Remain in area in safe location to assist first responders. Depending upon the toxicity of material, pull the fire alarm to evacuate the building.
5. **Decontamination Procedures**
   1. The procedure for decontaminating surfaces from these classes of chemicals is going to vary depending on the chemical. For example, any t-butyl lithium that is spilled will spontaneously combust under normal atmospheric conditions so there is not much left to decontaminate. Review the chemical safety sheets for the specific chemical to determine the best practice for decontamination.
6. **Waste Disposal Procedures**
   1. Contact EH&S for waste disposal.
7. **Safety Data Sheet Location**
   1. Safety Data Sheets must be available