Precision Heating Project Testing Procedures

Facility

Access to a Chem Lab is needed for the testing. Generally this has been arranged either during an open period in the lab room or after school. Each group requires 2 sessions.

Safety

The Safety requirements are essentially the same as for the Calorimetry lab done in HS Chem Lab, with a reminder emphasis on the safe handling of hydroxides if they are used.

The lab safety procedures for the labs are included at the end of this section

Salts:

Heats of solution of the candidate salts may be endothermic, slightly exothermic, very exothermic, different hydrations, insoluble, expensive, and have different levels of hazard.

The instructor can choose which salts to include in the project. For example, lithium salts are on the list, but quite expensive. These are not stocked. If a group proposes a lithium, they have not considered costs in their analysis and instructed to do so. Hydoxides are more hazardous than others. However, the typical molarity is reasonable and students have experience with them in HS Chem Lab. These groups are positioned in the front for closer supervision. If there is a stronger safety concern, these salts can be dropped from the list.

The original list appears long. Some groups winnow it quite efficiently and get the full information for only the serious candidates. Other groups slog through it. The discussion when the candidates are presented also deals with strategy in organizing work efficiently.

Equipment

Selected Salts

1 Balance
Weigh boats
3L DI water (keep in the lab overnight, must be in thermal equilibrium with surroundings)
Spatulas for each salt

For each group station:

1 Ring stand
2 large clamps (soda can size)
2 small clamps (for thermometers)
2 digital thermometers
1 Graduated cylinder (100mL)
1 Stopwatch
2 Stirring rods

Laboratory Safety—Summary of Major Points

Focus on the task or activity is in front of you
This is the most important rule. Many accidents happen when students are distracted. **Sudden movements or fooling around also lead to distractions from the hazards. These behaviors can cause others in the room to lose attention and lead to an accident.** The approved procedure must be followed--No unauthorized procedures are allowed.

Goggles must be worn at all times. No Exceptions. The eyes are the most vulnerable part of your body and they must always be protected.

Dress Appropriately—You must have your body covered to the neck, long sleeves, long pants and closed toe shoes. Note**: Shirts and sweaters must be long enough to cover the back at all times.** Contact lenses are not to be worn. Hair must be pulled back. For your own safety, you will not be permitted to do the lab activities if you are not dressed appropriately.

No Food or Drink—There is the risk of contamination of these items with the chemicals in the lab. You must wash your hands before leaving. Your hands may have been in contact with unknown or toxic materials.

Emergency Evacuations-- Know the layout of the Laboratory. You should memorize the location of the safety shower, eyewash, and alternate exits. In the case of an emergency evacuation, including fire drills, follow the instructions to shut down equipment and leave the room.

Report all accidents immediately. Accidents sometimes happen. The important point is to notify the instructor so that the best remedial action can be taken. Taking the wrong action may make the situation worse.

Remain Calm—If an accident does happen, make a conscious effort to remain calm. Have a lab partner alert the instructor. If you are able to, begin to move to the appropriate safety station, such as the eyewash or shower. If there are any questions about the procedure, wait for the instructor to arrive and follow his or her instructions.

Clean Lab Area—Keep your workspace orderly during the period. This is a major step in reducing hazards. At the end of the period, the equipment should be organized and the lab bench clean. An inspection by the instructor is necessary before dismissal from the lab.

Respect Corrosive Chemicals—particularly sodium hydroxide and acids. Sodium hydroxide is the most hazardous substance to cause damage to your eyes. Always keep solutions below eye level. When handling these solutions, such as dissolving and diluting, act carefully. Most accidents with these compounds occur by overaggressive mixing, splattering, or knocking over the containers. Keep them below eye level.

Dispose of Waste Properly—Some of the compounds cannot be flushed down the drain. Soluble salts may be disposed in the sink, Please check with your instructor to determine the appropriate disposal method. Do not return unused portions of a chemical or reagent to its original bottle.