Notes on Procedure for Experiment No. 5 – Week 2

By now you should be comfortable with the procedure. You will be repeating it 6 times during the second week, with slight modifications.

Start with the determination of enthalpy by Hess’s Law (part C).

Retrieve your calorimeter from the drawer in which it was stored following last week’s experiment. Obtain two pre-cut pieces of magnesium ribbon from the balance room, a piece of emery cloth, board, and tweezers from under the window. Use the emery cloth to scrape off the dark oxide layer on the magnesium ribbon until it is shiny. Weigh the calorimeter, add 25 to 30 mL of 1 M HCl and re-weigh. Do this using a top loader balance so that the acid will not be near the analytical balances. Weigh the clean magnesium ribbon on the analytical balance (because it is such a small mass, 100-120 mg). After collecting the room temperature data, add the magnesium and collect the rest of the data.

Repeat with the second piece of magnesium. Dispose of the used solutions in the waste jugs that are located in the right-hand fume hood.

You will then do two runs with the magnesium oxide. The differences in procedure are that you will use 3 M HCl and magnesium oxide instead of 1 M HCl and magnesium ribbon. Weigh the magnesium oxide on weighing paper. It will be in vials in the balance room. Magnesium oxide is somewhat hygroscopic; i.e., it absorbs moisture from the air. As it gets moist, it sticks to the weighing paper. Therefore, you need to add it to the calorimeter as quickly as possible after weighing. You might even start the room temperature data gathering and then weigh the magnesium oxide at the same time. The magnesium oxide often encrusts on the bottom of the calorimeter during the experiment and dissolves slowly. You should swirl the solution in the calorimeter occasionally. But be careful not to poke a hole in the calorimeter. Repeat with a second portion of magnesium oxide. Dispose of the used solutions in the waste jugs that are located in the right-hand fume hood.

Finally, you will do the determination of the heat of solution (part B). Weigh the calorimeter and water on a top loading balance. The unknowns will be in test tubes. They are whitish solids that are quite corrosive and deliquescent; i.e., they will absorb so much moisture from the air that, in time, an aqueous puddle will form, and they will dissolve in that puddle. They are even more corrosive in that form. Also, many of the unknowns are in the form of beads that would roll off of weighing paper, so you will weigh them in small plastic dishes. Again, you should add them to the calorimeter and water as quickly as possible after weighing. Weigh or tare the dish on the top loading balance and add about half of the test tube’s contents. You may be able to pour the unknown or it may be necessary to use a spatula to break up and transfer the solid if it has chunked up. Repeat with the rest of the unknown sample. Dispose of the solutions in the waste jugs in the right-hand fume hood.

After finishing, return the stir bar. Rinse the weighing dish with distilled water and place it in the tray near the entrance door to the balance room. You can discard the calorimeter or put it in the box to save for next year, or even keep it. Return all other equipment to where it belongs.