

## Heat Lab

In order to do this experiment, LoggerPro must be opened on the laptop to collect data. At the beginning of each day of experimentation, the room temperature must be recorded prior to any other experiments.

For the first experiment, water which is above room temperature must be collected in a Styrofoam cup and the amount of water must be measured. Then, the thermometer must be placed in the water for a total of 5 minutes and LoggerPro should be recording the change in temperature of the water and displaying it in graphical form. The slope of the graph will calculate the cooling rate for the water in degrees per second.

The next experiment determines whether hot water cools faster than cooler water. To do this, two Styrofoam cups are filled with water of the same volume. However, one cup is filled with hot water and the other is filled with cooler water. Temperature of the water above room temperature is recorded. Thermometers are placed in each cup and the temperature change is observed for five minutes. After this period of time, graphs are created on LoggerPro and results can be derived from the slope of the temperature.

The third experiment determines whether hot water cools faster than cool water warms up. In order to do this experiment, two Styrofoam cups are filled with equal volumes of water. One cup is filled with hot water and the other cup is filled with cold water. Next, the temperature above and below room temperature is recorded. After this, thermometers are placed in each cup and the temperature change is recorded over an interval of five minutes. The slopes of the lines determine the results.

For the next experiment, two cups are filled with equal volumes of water; one with hot water and one with cold water. Next, the temperatures are recorded of both. After this, the cold water is mixed in the same cup with the hot water and the temperature where the water levels off is recorded. This is the point on the graph where the lines of the graphs are at the same abscissa value. This experiment is then repeated for three different temperatures of water.

For the fifth experiment, the latent heat of fusion for ice is estimated. To do this, ice is placed in cooler water and the high and low temperature is recorded. With this information, the latent heat of fusion can be calculated for ice. One must take into account the volume of the water and the volume of the ice.

For the next experiment, the specific heat of four substances must be calculated. It must be calculated for two metals and two nonmetals. In order to do this, the metal/nonmetal is soaked in hot water and the temperature is recorded. Then, the substance is placed in water. The temperature before and after is recorded for the water in which the substance was placed.

For the final experiment, the rate of cooling during evaporation of two different kinds of alcohol and water was observed. To do this, pieces of tissue paper with equal surface areas were attached to the tips of three different thermometers using rubber bands. Next, each was dipped into the alcohols or the water and allowed to evaporate. The temperature change was measured in LoggerPro as the liquids evaporated.