Physics 202 Lab 3
Calorimetry

Apr 22, 2013

Equipment

- Styrofoam cups (large)
- Styrofoam square lid with no holes
- Digital thermometers (each with 2 leads)
- Beakers (400 mL)

Set Up

In this experiment we will be studying the transfer of heat. The timing can be fairly quick, so read through completely through this part before starting the measurements.

A calorimeter is a system designed to investigate the transfer of heat. The system is isolated so the total heat in the system is constant. That means that any heat lost in one part must be gained by another.

Measure the mass of the empty calorimeter. Be sure to include the thermometer also. Fill the calorimeter to roughly 2/3 full with hot tap water. Measure the mass of both.

Obtain several ice cubes directly from the freezer, noting the temperature of the freezer. Measure the temperature of the water just before adding the ice cubes and closing the calorimeter.

Mix and Measure

Add the ice cubes and gently swirl the mixture continuously, and record the final temperature of the mixture when all of the ice has just melted and calculate the change in temperature for the hot water and the ice cubes.

Measure the total mass of the calorimeter. Calculate the mass of the mixture and the mass of the original ice cubes.

Now we can calculate the heat lost by the hot water using the equation

$$Q = mc(\Delta T)$$

This heat lost must flow into the ice cubes. This heat both melts the ice and raises the temperature of the melted ice cubes up to the final temperature. Calculate the heat required for both of these changes.

Determine the percent difference between the heat lost and the heat gained and list possible sources of error in this experiment.