Coffee Cup Calorimeter Lab

Objective:

With the materials provided, design a hot pack and a cold pack using two of the four ionic compounds provided. The goal of this lab is to write and carry out a procedure for testing how each compound reacts when dissolved in water, and to determine which compound would create the most effective hot pack and which would create the most effective cold pack.

Materials:

- 50 g potassium chloride
- 50 g calcium chloride
- 50 g sodium bicarbonate
- 50 g sodium carbonate
- scoopula
- distilled water
- (2) beakers or graduated cylinders (for measuring 100 mL of water)
- (8) magnetic stirrers
- magnetic stir plates
- electronic balance
- weigh boats
- (2) timers
- markers
- ring stand and thermometer clamp
- (8) coffee cup calorimeters
  - (16) polystyrene foam cups and lids with openings
  - (8) thermometers

Students should wear safety goggles, aprons, and gloves.

Procedure:

1. Design a laboratory procedure for testing the temperature changes observed when distilled water is mixed with each of the following ionic compounds: potassium chloride (KCl), calcium chloride ($CaCl_2$), sodium bicarbonate ($NaHCO_3$), and sodium carbonate ($NaCO_3$).

2. Follow all lab safety precautions and record all data in a data table.

Questions:

1. What effect did each ionic compound have on the temperature of the water?

2. Which compound do you believe would make the best hot pack? Which compound would make the best cold pack? Why?