FLINN SCIENTIFIC

Name____

Discovering Instant Cold Packs

Part A. What Is an Instant Cold Pack?

Name of solid	
Warning	
Formula of solid	
Molar mass	
Mass of solid	
Moles of solid	
Volume of water	
Mass of water	

Part B. Measuring the Heat of Solution

Design and carry out a procedure to determine the enthalpy change (ΔH_{soln}) that occurs when the cold pack solid dissolves in water. Use a maximum of 5 g of solid per measurement. Write out the procedure in steps and construct a data table that shows the data that will be collected and the measurements that will be made. Have your teacher check the procedure and data table before beginning the experiment.

Procedure

1.

2.

3.

4.

5.

6.

Data Table. Enthalpy Change for Dissolving the Cold Pack Solid

Post-Lab Calculations and Analysis

1. Calculate the *heat energy change in joules* when the cold pack solid dissolved in water in your experiment.
   Recall: $q = m \times s \times \Delta T$, where s (specific heat of water) is equal to 4.18 J/g·°C.

2. Calculate the energy change in joules per gram of solid for the cold pack solid dissolving in water.

3. Calculate the energy change in units of *kilojoules per mole* of solid for the cold pack solid dissolving in water. To do this:

   a. Convert the heat energy change found in Question #1 to kilojoules.

   b. Convert the grams of solid used in the experiment to moles.

   c. Divide the energy change in kilojoules by the number of moles of solid to determine the energy change in units of kJ/mole. If more than one trial was performed, also calculate the average value of the heat of solution.

4. Using the result from Question #3*c* and the information obtained in Part A, calculate the number of kilojoules involved when the entire cold pack is activated.

5. Circle the correct choices to summarize the heat change that occurs when the commercial cold pack is activated:

   "When the white solid in the commercial cold pack dissolves in water, the pack feels *(hot/cold)* because the temperature of the solution *(increases/decreases)*. Energy is *(absorbed/released)* from the surroundings during this reaction and the reaction is classified as *(endothermic/exothermic)*. The sign of ΔH for the heat of solution is *(positive/negative)*."