Name: _____   **Date:_____**

Lab – Heat of solution

Problem: Does dissolving ionic salts in water change the temperature of water. If there is a change in temperature, is the change in temperature proportional to the amount of salt added. What happens to the salts dissolved in water?

Make a prediction: (Write using complete sentences)

Materials:

- Electronic Balance
- Steel thermometer or Alcohol thermometer
- Lab quest if using steel thermometer or use iOS or android app Graphical Analysis Vernier.
- Ammonium Chloride / Calcium chloride or any salt given
- Weighing boats
- Tap water
- Measuring cylinder
- Aluminum Calorimeter

Procedure:

- Turn the balance on
- If the balance has a zero or tare switch / button press it until the values read zero
- Place a weighing boat on the balance, tare it or zero it.
- Add the given salt to the weighing boat so that the mass is exactly 0.5 grams.
- Measure 50 mL of tap water into the calorimeter.
- Record the temperature of water using the thermometer in the sheet provided
- Add 0.5 gram of the salt that was massed into the 50 mL of measured water and gently stir it using stirring rod in the calorimeter and measure the temperature of the solution. (If the temperature increases measure the highest temper or if the temperature decreases measure the decrease in temperature.
- Repeat the experiment with the second ionic compound and 50 ml of fresh tap water
- Record the highest and lowest temperature as done before after mixing the salt.
- Transfer the values to the table given below

Name: _____   **Date:_____**

Trail #	Mass compound 1	Difference in Mass	Initial T_1 Temperature Of water	Final T_2 Temperature Of water	$\Delta t = T_1 \text{-} T_2$
Trail #	Mass compound 2	Difference in Mass	Initial T_1 Temperature Of water	Final T_2 Temperature Of water	$\Delta t = T_1 \text{-} T_2$

- Calculate the heat energy released / absorbed during the dissolution process
- Use the equation $q = mc\Delta T$ ($\Delta T = t_1 - t_2$) and determine the molar enthalpy of dissolution or heat of solution for the two compounds.

Compound 1	Compound 2
$q = mc\Delta T$	$q = mc\Delta T$

Name: _____   **Date:_____**

Discussion questions:

1. What was the name of the salt that you added to water?

2. Was the compound used to dissolve in water an ionic compound or molecular compound? Explain how you determined that?

3. When you added the salt to water was there a rise in temperature or a fall (decrease) in temperature? Was the change exothermic or endothermic?

4. What was the value of rise in temperature when 0.5 grams of the salt was added to water in the first experiment?

5. If you repeated the experiment with 1.0 gram of the ionic compound will the rise or fall in temperature be the same, or what will the magnitude of change be?

6. What are some conditions that can be used to predict the solubility of ionic compounds in water.

7. Draw to illustrate the formation of hydration shell when an ionic compound dissolves in water.
    a. q for Compound 1 _____

    b. q for Compound 2 _____

8. Define Molar enthalpy with units and give the values for
    a. Compound 1 _____

    b. Compound 2 _____

Name: _____   **Date:_____**

Safety Precautions:

- Use safety goggles at all times
- If you come in contact with any chemicals or salts wash them off using tap water
- Inform your teacher ASAP
- Dispose of all chemicals as instructed by your teacher