Name:

SCH4U: 3-2G: Calorimetry Lab CONTENT FORMATIVE

In this lab you will construct a coffee-cup calorimeter using Rosedale's Virtual Chemistry Lab and then measure the temperature change that occurs when ammonium chloride is dissolved in water. From your observations you will be able to calculate the heat transferred during this reaction and thus determine the change in enthalpy.
The link to the lab is: https://rosedaletube.com/zfiles/Science/sch4u/unit2/3-Calorimetry%20Lab%20output/story_html5.html

Equipment:

- safety goggles
- lab coat
- protective gloves
- coffee cups (2)
- styrofoam lid
- thermometer
- scale
- stirring rod
- beaker

Materials

- distilled water
- ammonium chloride powder

Procedure:

1. Put on your lab coat, goggles and gloves.
2. Construct the coffee-cup calorimeter by placing a styrofoam cup inside another styrofoam cup. Take the styrofoam lid, which has the thermometer and the stirring rod sticking through it, and place it on top of the nested coffee cups.
3. Place the calorimeter on the scale and record the mass, in grams, in the results table below.
4. Remove the lid of the calorimeter and pour 50 mL of distilled water into the nested styrofoam cups
5. Place the lid back on the calorimeter, and place the calorimeter, with the water in it on the scale. Record the mass in the results table.
6. Measure the temperature of the water in the calorimeter. Record this value in the results table, this will be your initial temperature.
7. Measure out 4.5 grams of ammonium chloride on the scale. Record the exact mass of ammonium chloride in the table below.
8. Add the ammonium chloride to the calorimeter and begin stirring the solution using the stirring rod. Continue stirring the solution throughout.
9. Observe the thermometer to see whether the temperature of the water increases or decreases.
10. Once the temperature stops changing, record the final temperature in the results table.
11. Clean up all your equipment and materials.

Results:

Table 1. Mass

Component	Mass (g)
Calorimeter	
Calorimeter + water	
Water ((calorimeter + water) - calorimeter)	
Ammonium chloride	

Table 2. Temperature

	Temperature (°C)
Initial Temperature	
Final Temperature	
ΔT	

Analysis:

1. Determine the heat change of the system (ammonium chloride). **Round your final answer to 3 significant digits. Show your calculations.**

2. Calculate the moles of ammonium chloride that was dissolved in the water. **Round your final answer to 3 significant digits. Show your calculations.**

3. Calculate the molar enthalpy of ammonium chloride in the solution. **Round your final answer to 3 significant digits. Show your calculations.**

4. The theoretical heat change for the dissolution of 1 mole of NH_4Cl is +14.7 kJ/mol. If the molar enthalpy you calculated was different than this, suggest any potential sources of experimental error that could account for this difference.

5. If the mass of ammonium chloride used in this experiment was increased, would the value of Q be different? Explain your reasoning.

6. If the volume of water used in the experiment was 100 mL instead of 50 mL how would the results of the experiment be different? Explain your reasoning.