ROSEDALE ACADEMY

SCH4U: 3-2D: Calculating Changes in Enthalpy Practice

Important info for this assignment:

- Q= m*C*ΔT
- Number of moles (n) = mass of sample / molar mass
- The Specific Heat (C) of water is 4.18 J/g˚C.
- The density of water is 1 g/mL

1. How much heat is required to raise the temperature of 6 mL of water (or 6 g of water) from 24.2 ˚C to 70.6˚C?

2. A 46.2 g sample of copper is heated and then placed in a calorimeter containing 75.0 g of water at 19.6 ˚C. The final temperature of the water is 21.8 ˚C. Calculate the heat gained by the water and the change in enthalpy of the copper.

3. A calorimeter is used to measure the change in enthalpy from the combustion of paraffin wax by burning a candle to heat a sample of water. The following data are collected:

Initial mass of candle	Final mass of candle	Mass of water	Initial temperature of water	Final temperature of water
24.7 g	23.6 g	340 g	15.0 ˚C	31.2 ˚C

The chemical formula of paraffin wax is $C_{22}H_{46}$, use the data above to determine:
a) the change in enthalpy for the combustion of paraffin wax
b) the molar enthalpy of combustion of paraffin wax.

4. A calorimeter was used to determine the molar enthalpy of solution of $AlCl_3$. When a sample of $AlCl_3$ was dissolved in water the following data were collected:

Mass $AlCl_3$	Mass of water	Initial temperature of water	Final temperature of water
10.0 g	250 g	20.0 ˚C	46.8 ˚C

Determine:
a) the change in enthalpy for this reaction
b) the molar enthalpy of solution of $AlCl_3$

5. When 13.4 grams of ammonium chloride (NH_4Cl) is mixed with 200 g of water it dissociates into ions and causes the temperature of the solution to drop from 21.0 ˚C to 15.3 ˚C.
Determine:
a) the change in enthalpy for this reaction
b) the molar enthalpy of solution for ammonium chloride

6. A temperature increase of 10.6 ˚C is observed in a calorimeter when 4.00 g of NaOH is dissolved in 100 mL of water.
Calculate:
a) the change in enthalpy for the dissolution of NaOH
b) the molar enthalpy of solution for NaOH