

Experiment 3: Determination of the enthalpy of dissolution ΔH_{diss}

Enthalpy

The enthalpy of dissolution, often known as the heat of dissolution, refers to the amount of heat released or absorbed when 1 mole of a substance completely dissolves. The enthalpy of solution ($\Delta H_{solution}$) can be positive when heat energy is absorbed (endothermic) or negative when heat energy is released (exothermic).

$$\Delta H_{dis} = \frac{Q}{n}$$

Where

- ΔH_{diss} : The enthalpy of dissolution
- Q : The heat energy
- n : Number of moles

The objective of the experiment

In this practice, the objective is to determine the enthalpy of dissolution in water of sodium hydroxide, potassium hydroxide, and ammonium chloride by calorimetry.

How to calculate

Since the system is isolated then

$$\sum Q_i = 0$$

$$Q_{gained} + Q_{lost} = 0$$

$$Q_{cold\ water} + Q_{substance} + Q_{calorimeter} = 0$$

Materials and Chemicals

Materials	Chemicals
<ul style="list-style-type: none">• Calorimeter with mixer• Thermometer• Beaker• Analytical balance	<ul style="list-style-type: none">• Distilled water• Potassium hydroxide (KOH)• Ammonium chloride (NH₄Cl)

Procedure

Part One

1. Take a beaker and ignore its weight before filling it with **m₁=100 g** of cool water.
2. Put the cold water into the calorimeter.
3. Close the calorimeter and wait for thermal equilibrium to be achieved, and take a temperature reading of the system (cold water + calorimeter), let it be **T₁**.
4. Weigh 5,61g of KOH, and then put it into the calorimeter.

5. Close the calorimeter and wait for thermal equilibrium to be achieved, and take a temperature reading of the system (cold water + product + calorimeter), let it be **T_{eq}**.

6. Record the obtained results in a table.

Part two

1. Take a beaker and ignore its weight before filling it with **m₁=100 g** of cool water.

2. Put the cold water into the calorimeter.

3. Close the calorimeter and wait for thermal equilibrium to be achieved, and take a temperature reading of the system (cold water + calorimeter), let it be **T₁**.

4. Weigh 5,34g of NH₄Cl, and then put it into the calorimeter.

5. Close the calorimeter and wait for thermal equilibrium to be achieved, and take a temperature reading of the system (cold water + product + calorimeter), let it be **T_{eq}**.

6. Record the obtained results in a table.

Product	Mass of Cold Water m ₁ (g)	Mass of substance m ₂ (g)	Temperature of Cold Water T ₁ (K)	Equilibrium Temperature T _{eq} (K)
KOH				
NH ₄ Cl				