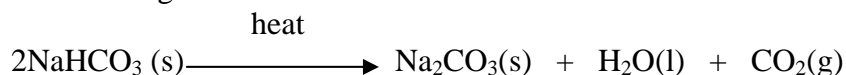


CHEMISTRY

Lab 15: DETERMINATION OF THE ENTHALPY CHANGE FOR THE THERMAL DECOMPOSITION OF SODIUM HYDROGEN CARBONATE

Aim: To calculate the enthalpy change of the thermal decomposition reaction of sodium hydrogen carbonate.

Background: When sodium hydrogen carbonate is heated, it decomposes to form sodium carbonate according to the reaction:

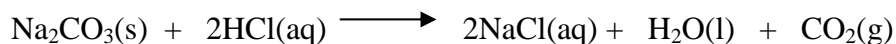


The object of this experiment is to determine the enthalpy change during this reaction. This enthalpy change is difficult to measure directly, so an indirect method is used.

You are provided with 2 mol dm⁻³ HCl, solid sodium carbonate and solid sodium hydrogen carbonate. By determining the enthalpy change between sodium carbonate and HCl, it is possible to obtain indirectly the enthalpy change for the decomposition of sodium hydrogen carbonate.

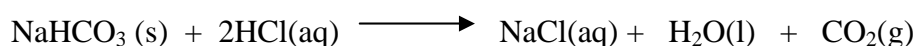
Procedure

Part A: The reaction of sodium carbonate with HCl.



1. Using a burette, measure 30 cm³ of HCl into a plastic beaker. Record the temperature of the acid.
2. Accurately weigh between 2.5g and 3.0 g of anhydrous sodium carbonate (Na₂CO₃) onto weighing paper.
3. Now add the weighed portion of Na₂CO₃ to the acid and stir the mixture carefully with the thermometer until all the solid has reacted. Rapid effervescence will occur. Be careful not to lose any of the reaction mixture by spilling. Record the maximum or minimum temperature of the solution after mixing and then reweigh the empty weighing paper.

Part B: The reaction of sodium hydrogen carbonate with HCl



Repeat part A using an accurately weighed sample of sodium hydrogen carbonate between 3.25 g and 3.75 g in place of the sodium carbonate.

Calculate the enthalpy changes associated with the reactions in Part A and Part B and use these values to calculate the enthalpy change of the thermal decomposition reaction of sodium hydrogen carbonate.

The literature value is 90.0 kJ mol⁻¹