Answer on Question #57014 – Chemistry - Other

Question:

Sodium bicarbonate ($NaHCO_3$) is often used in the kitchen to extinguish fires. When heated, it decomposes into sodium carbonate, water vapor and carbon dioxide. The ΔH for the reaction of 1 mole of sodium bicarbonate is +64.6 KJ.

- **a) Write a balanced thermochemical equation for this reaction.**
- b) **Using the enthalpies of formation, calculate the enthalpy of formation of sodium bicarbonate.**

Answer:

- **a)** $2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$
- **b)** $\Delta H_r = \sum \Delta H_{(products)} - \sum \Delta H_{(reagents)}$
  $\Delta H_0(Na_2CO_{3(s)}) = -1130.7$ kJ/mol
  $\Delta H_0(CO_{2(g)}) = -393.5$ kJ/mol
  $\Delta H_0 (H_2O_{(g)} = -241.8$ kJ/mol
  $+64.6 = [(1/2) \cdot (-1130.7) + (1/2) \cdot (-393.5) + (1/2) \cdot (-241.8)] - \Delta H_f(NaHCO_3)$
  $\Delta H_f(NaHCO_3) = -947.6$ kJ/mol