

THERMOCHEMISTRY

Date: _____ Name: _____ Section: _____

Partner: _____

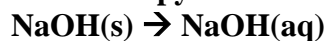
OBJECT: To determine the enthalpies of reaction for three chemical reactions and to use these data to verify Hess' Law of Enthalpy Summation.

PROCEDURE: As in the Chem 1105 lab manual, pp. _____.

OBSERVATIONS:

DATA:

Part 1: The enthalpy of solution of solid sodium hydroxide.



	Run 1	Run 2
Mass of NaOH and boat		
Mass of boat		
Mass of NaOH		
Volume of water		
Mass of water (density = 1.00 g/mL)		
Total mass of solution		
Initial temperature of water (T_1)		
Final temperature of water (T_2)		
ΔT		

Part 2: The enthalpy of neutralization of solid sodium hydroxide.
 $\text{NaOH(s)} + \text{HCl(aq)} \rightarrow \text{NaCl(aq)} + \text{H}_2\text{O(l)}$

	Run 1	Run 2
Mass of NaOH and boat		
Mass of boat		
Mass of NaOH		
Volume of HCl and water		
Mass of HCl and water (density = 1.00 g/mL)		
Total mass of solution		
Initial temperature of solution (T_1)		
Final temperature of solution (T_2)		
ΔT		

Part 3: The enthalpy of neutralization of aqueous sodium hydroxide.
 $\text{NaOH(aq)} + \text{HCl(aq)} \rightarrow \text{NaCl(aq)} + \text{H}_2\text{O(l)}$

	Run 1	Run 2
Volume of HCl solution		
Volume of NaOH solution		
Total volume of solution		
Initial temperature of NaOH solution		
Initial temperature of HCl solution		
Average temperature of two solutions (T_1)		
Final Temperature (T_2)		
ΔT		



1. The heat energy change of the solution (in Joules).
2. The number of moles of NaOH used.
3. The number of moles of HCl used.
4. The enthalpy of reaction. Also calculate the average enthalpy.



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II. Verification of Hess' Law:

In the space provided below, write out the three chemical equations performed in the lab. Show that one of the three reactions is the sum of the other two by chemically adding the two reactions together. Next, show that this summation is confirmed by the summation of the ΔH values that you have determined. Finally, calculate the percent deviation between the two supposedly equal values.

RESULTS:

In the summary table below, state your ΔH values for all three reactions.

	Run 1	Run 2	Average
Reaction 1			
Reaction 2			
Reaction 3			

CONCLUSION:

Was Hess' Law verified to within 5% error?

