

LAB – DETERMINING THE ENTHALPY OF REACTION

PURPOSES:

- To experimentally determine the enthalpy of reaction for the reaction of sodium hydroxide and sulfuric acid.
- To calculate the theoretical value for the enthalpy of reaction using standard enthalpies of formation.
- To compare these two values to each other by calculating percent error.

MATERIALS: coffee cup calorimeter, thermometer, graduated cylinders, 1 M sodium hydroxide solution, 1 M sulfuric acid solution.

PROCEDURE:

Working with your lab partner, decide upon a procedure, which will allow you to determine experimentally the enthalpy of this reaction. In order to accomplish this, you will need to write down the balanced equation for the reaction and then determine amounts of reactants needed, such that there is **NO LIMITING REACTANT**, and **NO EXCESS REACTANT**. This means you will need to do some basic stoichiometry before getting started. Make sure not to exceed the capacity of your calorimeter. It can hold a total of about 75-100 mL comfortably.

QUESTIONS / CALCULATIONS:

1. Show all necessary calculations for determining the experimental enthalpy of the reaction which took place in your cup,
2. Using the calculation from part 1, show the calculations necessary to find the change in enthalpy for the equation as written.
3. Show the calculations necessary to find the theoretical change in enthalpy for the equation as written.
4. Bonus calculation -- calculate what the theoretical temperature rise in your cup should have been. Immediately following this calculation, explain how you did it in **neat** handwriting.

Helpful numbers

NaOH(aq): -470 kJ/mol

H₂SO₄(aq): -909 kJ/mol

H₂O(l): -286 kJ/mol

Na₂SO₄(aq): -1389 kJ/mol

4. Calculate your percent error.

CONCLUSION

Write a conclusion which explains the math of the lab, discusses assumptions that you made and discusses possible sources of error.