

AP Chemistry Calorimetry Lab

Prelab Questions

- 1) What is a calorimeter?
- 2) Write the net ionic equation for the reaction between HCl and NaOH.
- 3) Write the net ionic equation for the reaction between HCl and KOH.
- 4) Write the net ionic equation for the reaction between HNO₃ and NaOH.
- 5) Write the net ionic equation for the reaction between HNO₃ and KOH.

Procedure

Find the Heat of Reaction for an Acid/Base reaction.

Use the same calorimeter as in the previous part. Never use a different calorimeter than the one you used in part 1.

Measure out 100.0 mL of 1.0 M HCl and record its temperature.

Measure out 100.0 mL of 1.0 M NaOH and record its temperature.

Mix the two together in the calorimeter and monitor the temperature while mixing. Record the highest temperature reached. Once the temperature starts to drop the reaction is done.

Repeat two more times.

Repeat the same procedure using HCl and KOH

Repeat the same procedure using HNO₃ and KOH.

Repeat the same procedure using HNO₃ and NaOH.

Sample Data Tables

Find the Heat of Reaction (you will need four of these tables. Can you figure out why?)

	Trial 1	Trial 2	Trial 3
Mass (volume) of Base			
Temperature of Base			
Mass (volume) of Acid			
Temperature of Acid			
Final Temperature Reached			

Post Lab Calculations

This table is a sample that may help you design your own for the post lab. You will need four of these tables.

	Trial 1	Trial 2	Trial 3
Temperature Change			
Heat Flow in Joules			
Moles of acid			
Enthalpy Change (kJ/Mole acid)			
Mean Value	XXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXX
Literature Value	XXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXX

The literature value is calculated using the standard enthalpy data tables from the book and doing products minus reactants.

Post Lab Questions

- 1) The net ionic equations for all of the acid base reactions are the same. Did your mean value for enthalpy change for each reaction come out to be the same? Explain.
- 2) Describe one experimental error that would lower the accepted value for the enthalpy change.
- 3) Describe one experimental error that would raise the accepted value for the enthalpy change.
- 4) Describe what would happen if you did this lab without the lid on the calorimeter.
- 5) Describe how the outcome of the lab would be different if you did not totally dry the inside of the calorimeter before each trial.