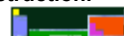


**Revised August 2011**



## HONORS LAB 10a: Enthalpy of Neutralization



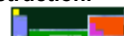
**Aim** To calculate a value for the standard enthalpy of neutralization

**Apparatus** Insulated cup, thermometer, measuring cylinder

**Chemicals** 1.00 M hydrochloric acid solution, 1.00 M sodium hydroxide solution

### **Method**

1. Using a graduated cylinder, place 50.0 mL of 1.00 M HCl solution into an insulated cup.
2. Record the initial temperature of the 1.00 M HCl solution.
3. Using a graduated cylinder, place 50.0 mL of 1.00 M NaOH solution into a second insulated cup.
4. Record the initial temperature of the 1.00 M NaOH solution.
5. **Carefully** combine the contents of the two cups in a single cup.
6. Keep stirring for several minutes and record the **highest** temperature reached.
7. Repeat the steps 1-6, this time using only 30.0 mL of each solution.



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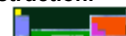
### Results

#### With 50.0 mL of each solution

	HCl	NaOH
Initial temperature		
Average initial temperature of the solutions <b>(before mixing)</b>		
Temperature of solutions <b>(after mixing)</b>		
Change in temperature		

#### With 30.0 mL of each solution

	HCl	NaOH
Initial temperature		
Average initial temperature of the solutions <b>(before mixing)</b>		
Temperature of solutions <b>(after mixing)</b>		
Change in Temperature		



**Conclusion/Calculation**

1. Using the equation

$$q = (m) (c) (\Delta T)$$

Where;

m = total mass of the solutions (assume the density to be = 1.00 g mL<sup>-1</sup>)

c = specific heat capacity of the solutions (assume to be = 4.18 kJ kg<sup>-1</sup> K<sup>-1</sup>)

$\Delta T$  = temp change

Calculate the energy change (q) in each of your experiments

**With 50.0 mL of each solution**

**With 30.0 mL of each solution**

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2. By using your answers in question #1, calculate the **standard enthalpy of neutralization**, given the definition below. You will also need to write an equation for the reaction.

**The standard enthalpy of neutralization is the enthalpy change per mole of water, formed in a reaction between an acid and a base.**

**With 50.0 mL of each solution**

**With 30.0 mL of each solution**

3. Why use an insulated cup?