Investigation 5.2.1 Molar Enthalpy of a Chemical Change

Submitted By: Tony Nguyen, Genard Nonan, Santiago Valdes, Chris Power

Submitted To: Mr. Romano

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**Observations:**

**Table 1:** Initial and final temperature of NaOH and HCl.

|  |  |  |
| --- | --- | --- |
| **Molecules** | **Initial Temperature** | **Final temperature** |
| NaOH | 24.6$℃$ | 30.4$℃$ |
| HCl | 24.2$℃$ | 30.4$℃$ |

**Discussion:**

1. The reaction that was observed throughout the process of the experiment was an exothermic reaction. This is due to the fact that heat was expelled from the reaction meaning that the temperature change was a positive, causing the temperature of the substance to rise rather than fall.
2. $D = 1 g/ml$

 $50 ml = 50 g$

 50 g of HCl and 50 g of NaOH

1. ΔTHCl= 30.4° C - 24.2° C

 ΔTHCl= 6.2 ° C

 ΔTNaOH= 30.4° C - 24.6° C

 ΔTNaOH= 5.8° C

1. $q\_{NaOH} =50g (4.18 J/g° C)(5.8℃) $

 $ =1212.2 J$

 $q\_{HCl} =50g (4.18 J/g° C)(6.2℃) $

 $ =1295.8 J$

 $q\_{Total} =q\_{NaOH} + q\_{HCl}$

 $= 1212.2 J +1295.8 J$

$q\_{Total} = 2508 J$

1. c= n

 V

 1.0 mol = n

 1.0 L V

 1.0 mol = n mol

 1.0 L 0.050 L

 n = (0.050 ~~L~~)(~~1.0~~ mol)

  ~~1.0 L~~

n = 0.050 mol

1. ΔHNaOH = -2508 J / 0.050 mol

 = -50,150 J or -50.15 kJ/mol

1. % difference = -50.15 kJ/mol ÷ -56 kJ/mol

 = 0.90

1. Make the calorimeter out of a material that is a better heat insulator
2. The density of the water is 1 mol/L. It will make the moles the same amount of liters, so when we’re solving for molecular enthalpy it affects it.