Experiment 2 – Aqueous Reactions Part I

Name name Lab Section 432

Results and Discussion

Data Table 1. Ammonium Chloride and Sodium Carbonate

	Ammonium chloride $NH_4Cl(s)->NH_4+(aq)+Cl-(aq)$	Sodium carbonate $Na_2CO_3(s)->2Na^+(aq)+CO_3^{2-}$
Mass (g)	1.034g	1.029g
Initial Temperature (°C)	23.2°C	22.0°C
Final Temperature (°C)	19.9°C	23.0°C
Moles (mol)	0.0193molNH4Cl	0.0097molNa2CO3
Change in Temperature (°C)	-3.3°C	1.0°C
□T/mol (J/mol)	$2.147*10^4$J/mol	$-1.294*10^4$J/mol

1.034gNH4Cl*1mol/53.49g=0.193molNH4Cl

D_{H2O}=1g/mL @RT

C_{H2O}=4.185J/g°C

$-(\Delta T/mol)*C_{H2O}*m_{H2O}=\Delta H/mol$ in units of J/mol

$(3.9°C/0.0193molNH_4Cl)*4.185J/g°C*30g= 2.147*10^4$J/mol

For Sodium Carbonate

$(1.0°C/0.0097molNa_2CO_3)*4.185J/g°C*30g= -1.294*10^4$J/mol

Data Table 2. Data Table 2 for Sodium Bicarbonate with Citric acid

	$3NaHCO_3(aq)+C_6H_8O_7(aq)->3H_2O(l)+3CO_2(g)+Na_3C_6H_5O_7(aq)$
Mass (g)	3.496g
Moles (mol)	$0.0416molNaHCO_3$
Final Temperature (°C)	15.0°C
Initial Temperature (°C)	22.9°C
Temperature Change (°C)	-7.9°C
□T/mol (°C/mol)	$-5.000*10^{-4}$°C/mol

$(3.496gNaHCO_3)(1molNaHCO_3/84.006gNaHCO_3)=0.0416molNaHCO_3$

$0.0416molNaHCO_3/-7.9\,^{o}C=-0.0005\,^{o}C/mol$ or $-5.000*10^{-4}\,^{o}C/mol$

Data Table 3. Hydrochloric acid and Magnesium

	$Mg(s)+2HCl(aq)->MgCl_2(aq)+H_2(g)$
Mass (g)	.050g
Moles (mol)	0.0020molMg
Final Temperature (°C)	28.9 °C
Initial Temperature (°C)	22.5 °C
Temperature Change (°C)	6.4 °C
□T/mol (°C/mol)	$3.000*10^{-4}\,^{o}C/mol$

(.050gMg)(1molMg/24.305gMg)=0.0020molMg
0.0020molMg/6.4 °C=0.0003 °C
Discussion/Conclusion:

Write a conclusion to your findings in Experiment 2. Be sure to discuss specifics of your experiment for all portions of the experiment and sources of error. Refer to the UNC writing Center at (http://writingcenter.unc.edu/resources/handouts-demos/specific-writing-assignments/scientific-reports#section-22) for some help. This should be no longer than 2 paragraphs.

The experiment was showing the different reactions that can occur in aqueous solutions and the data shows how the temperatures can change for each experiment. There are exothermic and endothermic reactions and the ones that were endothermic are Ammonium Chloride with water and Sodium Bicarbonate with Citric Acid. The exothermic are dissolving Sodium Carbonate in water and Hydrochloric acid and Magnesium. The solvents are water, Citric acid, and Hydrochloric acid while the solutes are Ammonium Chloride, Sodium Bicarbonate, Sodium Carbonate, and Magnesium.

This experiment did help students use skills such as balancing equations, converting from grams to moles, as well as use an equation in order to find the J/mol or °C/mol for each experiment. Some possible sources of errors are perhaps not being exact in measuring the temperature while observing the thermometer and also perhaps being slightly off on the mass when weighing or the amount of the solvent being used. You can also see how the temperature change shows whether or not a reaction is endothermic or exothermic. If the temperature change is negative then it's endothermic since its not releasing heat, however if it's positive like for Sodium Carbonate in water and Hydrochloric acid and Magnesium then its exothermic due to it releasing heat.