

ENTHALPIES OF REACTION

DATA SHEET

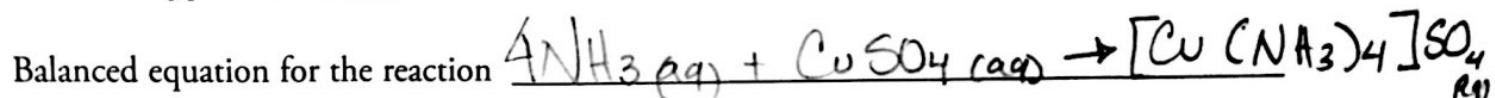
5.1: Calibration

Record the heat capacity of the calorimeter, C_{cal} : 37.5 J/K

5.2: Enthalpy of solution

		Salt #1	Salt #2
	Identity of the ionic salt	KNO_3	Na_2CO_3
	specific heat	4.085 J/K g	3.992 J/K g
	mass _{dry empty calorimeter}	6.79	6.79
	mass _{calorimeter + water}	55.95	55.95
1	mass _{water}		
	mass _{ionic salt}	1.94	2.00
2	moles _{ionic salt}		
3	mass _{solution (salt + water)}		
	$T_{\text{initial soln}}$	23.0 °C	22.8 °C
	$T_{\text{final soln}}$	21.5 °C	24.5 °C
4	ΔT		
5	q_{cal}		
6	q_{soln}		
7	q_{rxn}		
8	$\Delta H_{\text{rxn}} = q_{\text{rxn}} / \text{mass of salt (J/g)}$		-
9	$\Delta H_{\text{rxn}} = q_{\text{rxn}} / \text{moles of salt (J/mol)}$		

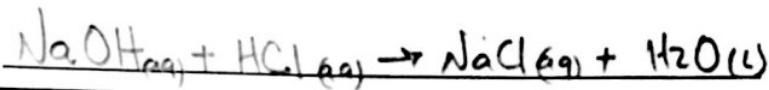
5.3: Enthalpy of formation



		Metal Cation Reactant	Complexing Reactant
	Identification	Cu^{2+}	NH_3
	Molarity	0.5 M	6.0 M
	Volume		
10	Moles		
	T_{init}	21.0 °C	20.0 °C
11	Average T_{init}		
	$T_{\text{final products}}$		25.1 °C
12	ΔT		
13	Mass of the solution ($\text{Mass}_{\text{solution}} = \text{Density}_{\text{rxn mixture}} \times \text{Volume}_{\text{rxn mixture}}$) Density of the reaction mixture is 1.01 g/mL		
14	q_{cal}		
15	q_{soln}		
16	q_{rxn}		
17	Moles _{limiting reactant}		
18	Moles _{metal complex formed}		
19	$\Delta H_{\text{rxn}} = q_{\text{rxn}} / \text{moles}_{\text{metal complex formed}} \text{ (J/mol)}$		

5.4: Enthalpy of Neutralization

Balanced equation for the reaction



		Reaction with HCl
	Identity of the acid	HCl
	Molarity of the acid	1 M
	Volume of the acid	25.0 mL
20	Moles of the acid	
	Identification of the base	NaOH
	Molarity of the base	1.1 M
	Volume of the base	25.0 mL
21	Moles of the base	
	$T_{\text{init, acid}}$	21.5 °C
	$T_{\text{init, base}}$	20.8 °C
22	Average T_{init} for the acid and base	
	$T_{\text{final products}}$	22.0 °C
23	$\Delta T = T_f - T_i$	
24	Mass of the solution ($\text{Mass}_{\text{solution}} = \text{Density}_{\text{rxn mix}} \times \text{Volume}_{\text{rxn mix}}$) Density of the reaction mixture is 1.00 g/mL	
25	$q_{\text{cal}} = C_{\text{cal}} \times \Delta T$	
26	$q_{\text{soln}} = C_{\text{soln}} \times m_{\text{soln}} \times \Delta T$	
27	$q_{\text{rxn}} = q_{\text{rxn, O}} = q_{\text{rxn, n}} + q_{\text{soln}} + q_{\text{cal}}$	
28	Moles _{limiting reactant}	
29	Moles _{H_2O formed}	
30	$\Delta H_{\text{rxn}} = q_{\text{rxn}} / \text{moles}_{\text{H}_2\text{O formed}} (\text{J/mol})$	

As always, attach your sample calculations. Calculations were performed for the shaded rows.