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	$mass_{solution\ (salt\ +\ water)}$		
	$T_{initial\ soln}$	23.0 °C	22.8 °C
	$T_{final\ soln}$	21.5 °C	24.5 °C
4	ΔT		
5	q_{cal}		
6	q_{soln}		
7	q_{rxn}		
8	$\Delta H_{rxn} = q_{rxn}$/mass of salt (J/g)		-
9	$\Delta H_{rxn} = q_{rxn}$/moles of salt (J/mol)		

5.3: Enthalpy of formation

Balanced equation for the reaction $4NH_{3(aq)} + CuSO_{4(aq)} \rightarrow [Cu(NH_3)_4]SO_4$

		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}		
	$T_{final\ products}$		25.1 °C
12	ΔT		
13	Mass of the solution ($Mass_{solution} = Density_{rxn\ mixture} \times Volume_{rxn\ mixture}$) 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	$\Delta H_{rxn} = q_{rxn}/moles_{metal\ complex\ formed}$ (J/mol)		

5.4: Enthalpy of Neutralization

Balanced equation for the reaction $NaOH_{(aq)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$

		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	
	$T_{init, acid}$	21.5 °C
	$T_{init, base}$	20.8 °C
22	Average T_{init} for the acid and base	
	$T_{final\ products}$	22.0 °C
23	ΔT $T_F - T_i$	
24	Mass of the solution ($Mass_{solution} = Density_{rxn\ mix} \times Volume_{rxn\ mix}$) Density of the reaction mixture is 1.00 g/mL	
25	q_{cal} $C_{cal} \times \Delta T$	
26	q_{soln} $C_s \times m_{soln} \times \Delta T$	
27	q_{rxn} $0 = q_{rxn} + q_{soln} + q_{cal}$	
28	Moles $_{limiting\ reactant}$	
29	Moles $_{H_2O\ formed}$	
30	$\Delta H_{rxn} = q_{rxn}/moles_{H_2O\ formed}$ (J/mol)	

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