Chemistry 1210 The Chemistry of Alka-Seltzer

Date:_____ Partner:_____Lab day/time:_____

Partner:_____

Objective:

1. To determine the enthalpy change associated with the chemical reaction initiated by dropping an Alka-Seltzer tablet in water.
2. To determine the activation energy associated with the chemical reaction initiated by dropping an Alka-Seltzer tablet in water.

Procedure: As in Chem 1210 lab manual, pp _____

Observations:

Data: Part 1A: Determination of the calorimeter constant

	Run 1	Run 2
Mass of dry calorimeter		
Mass of calorimeter plus water		
Initial temperature		
Final temperature		
Mass of calorimeter + water + melted ice		

Part 1B: Determination of ΔH for the process

	Run 1	Run 2
Mass of dry calorimeter		
Mass of calorimeter plus water		
Initial temperature		
Final temperature		
Mass of calorimeter + water + Alka-Seltzer		

Part 2: Determination of E_a for the process

Run	1	2	3	4	5
Temperature (°C)					
Time (t_x) (min : s)					

Calculations: Part 1A: Determination of the calorimeter constant
(Show the run 1 calculation in detail, and the results at each step for run 2.)

Run 1	Run 2
Mass of "warm" water	
Mass of ice (=mass of "ice" water)	
ΔT of "warm" water (as it cools to T_{final})	
ΔT of "ice" water (as it warms to T_{final})	
Energy required to melt the ice (in J)	
Energy absorbed by the "ice" water as it warms up to T_{final} (in J)	
Energy lost by the "warm" water as it cools to T_{final} (in J)	
Energy lost by the calorimeter as it cools to T_{final} (in J) *(Hint: What should all these heats add to give?)*	
Calorimeter constant (the heat capacity of the calorimeter) (in J/°C) ($C_{calorimeter}$)	
Average Calorimeter constant	

Calculations: (Continued) Part 1B: Determination of ΔH for the process
(Show the run 1 calculation in detail, and the results at each step for run 2.)

Run 1	Run 2
Mass of water + Alka-Seltzer	
ΔT	
Heat energy change of the calorimeter (in J)	
Heat energy change of the solution (in J)	
Moles of citric acid	
Enthalpy (ΔH) (in kJ per mole of citric acid)	
Average ΔH	

Calculations: (continued) Part 2: Determination of E_a for the process

Run	Temp (°C)	Temp (K)	Time (t_x) (s)	$1/t_x$ (1/s)	ln ($1/t_x$)	1/T (1/K)
1						
2						
3						
4						
5						

Graph – graph ln($1/t_x$) vs 1/T

Identify the slope m: _____

Calculate Ea (in kJ/mole):

Results:

For the reaction initiated by dropping an Alka-Seltzer tablet in water:	
ΔH	
E_a	

Discussion: For each of the two parts, give a source of experimental error and state how the calculated results would be affected.

Conclusion: - Omit

Questions: Attach assigned question(s)