12b Determination of Activation Energy (3247881)

| Question | 1 | 2 | 3 | 4 | 5 | 6 |

Instructions
Materials: 1 clean evaporating dish, 4.0 M acetone/1.0 M HCl solution, 0.0012 M iodine (needs to be prepared fresh-0.25 g KI and 0.16 g Iodine in 500 mL, (dissolve the Iodine in a few mL of ethanol in a small test tube first and add it to the dissolved KI), stirring rod, two pipettes, four extra large test tubes, 5 thermometers, one hot water bath, one warm water bath, one cool water bath, one cold water bath.

Objective: To determine the activation energy for a reaction.

Background: This lab is an extension of the Rates of Reaction Lab from Pre-AP Chemistry. The rate law, as determined from the previous lab is: Rate = k [Acetone] $[H^+]$ $[I_2]^0$ and rate can be calculated by dividing the concentration of iodine by the time.

Procedure:

1. Obtain 10.0 mL of acetone/HCl solution with the repipette and place it into a clean evaporating dish.

2. Obtain 10.0 mL of iodine solution with a pipette.

Don't forget to take a photo during the lab for your lab report!

3. With a timer ready, add the iodine to the acetone/HCl solution in the evaporating dish. Start timing the second you add the acetone. Mix the contents of the well with a stirring rod for about 5 seconds. When the color disappears, record how many seconds (round off to the nearest second) elapsed from the time of mixing to time of reaction.

4. Obtain 10.0 mL of Iodine solution with a pipette and place it into a clean extra large test tube. Place the test tube into one of the water baths. Repeat until you have a test tube with Iodine solution in each water bath. Allow the test tubes to sit for about five minutes to reach the temperature of the bath.

5. Repeat step #3 with the other iodine solutions which are at different temperatures. Record the temperatures of the hot water baths and ice bath as the average between the actual temperatures and room temperature.

5. Discard the solutions into the sink and rinse the dish with water.

Calculations:
1. Using the Data Analysis App, create a graph of ln(k) vs. 1/T(Kelvin). Enter 1/T first followed by ln(k).

2. Determine the activation energy and collision frequency using the Arrhenius equation: $\ln(k) = -E_a/R(1/T) + \ln(A)$ where E_a is the activation energy and A is the collision frequency.

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1.   Question Details   Objective and procedure summary [3413760]

Restate the objective in your own words using complete sentences. Summarize the steps in your procedure. (Be sure and include any safety concerns).

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2.   Question Details   Lab Partners [1837468]

Enter the name(s) of your lab partner(s). (If you worked by yourself, enter "none").

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3.   Question Details   AP Determining Activation Energy Lab Data [2466614]

	Time (sec)	Reaction Temp(°C)	Inverse Temp (1/K)	k	ln k
1	4.0✓	4.0✓	4.0✓		4.0✓
2	4.0✓	4.0✓	4.0✓		4.0✓
3	4.0✓	4.0✓	4.0✓		4.0✓
4	4.0✓	4.0✓	4.0✓		4.0✓
5	4.0✓	4.0✓	4.0✓		4.0✓

Enter the slope from the graph of ln(k) vs. 1/Temperature:(round to three significant figures) 4.0✓

Enter the y intercept from the graph of ln(k) vs. 1/Temperature:(round to three significant figures) 4.0✓

Calculate the activation energy:(round to three significant figures) 4.0✓   J

Calculate the collision frequency: (round to three significant figures) 4.0✓

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4.   Question Details   Upload Lab Photo [3413757]

Upload a photo of the lab apparatus with your face in the photo as you perform some part of the lab. Title the image with a unique file name before you upload it.(Maybe use your initials and part of the lab title) [Choose File] no file selected   It must be less than 5 MB in size.

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5. Question Details

Activation Energy Lab Graph [3231433]

Upload a screen shot of the graph you made to determine the activation energy. The screen shot file must be smaller than 2 MB. [Choose File] no file selected

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6. Question Details

Observations, Skills utilized and learning [3413764]

What observations did you make during the lab? What chemistry concepts, laws, and/or skills were necessary to complete this lab? What did you learn or re-learn? Use complete sentences.

Assignment Details

Name (AID): **12b Determination of Activation Energy (3247881)**
Submissions Allowed: **5**
Category: **Homework**
Code:
Locked: **Yes**
Author: **Ryan, Matt (** mryan@allsaintsschool.org **)**
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