

12 Reaction Rate Lab (1777043)

Question

1 2 3**Description**

No calculator allowed on this lab. Set up a spreadsheet in Numbers to do the calculations.

Instructions

Materials: 4 clean evaporating dishes, 10mL graduated pipettes, 4.0 M acetone, 0.0012 M iodine, 1.0 M HCl, Distilled Water, stirring rod, 4 tiny test tubes, test tube rack, timer.

Objective: To determine the rate law for a reaction with three reactants: acetone, iodine and HCl.

Procedure:

1. Label the 4 evaporating dishes with the numbers 1-4 using a Sharpie marker(on the side).

2. Obtain 10mL of HCl solution in a pipette. Dispense the HCl as follows:

In the dish labeled #1, add 2 mL HCl.

In the dish labeled #2, add 2 mL HCl.

In the dish labeled #3, add 4 mL HCl.

In the dish labeled #4, add 2 mL HCl.

3. Obtain 10mL of iodine solution in a pipette. Dispense the iodine solution as follows:

In the dish labeled #1, add 2 mL iodine.

In the dish labeled #2, add 2 mL iodine.

In the dish labeled #3, add 2 mL iodine.

In the dish labeled #4, add 4 mL iodine.

4. Obtain 10mL of distilled water in a pipette. Dispense the water as follows:

In the dish labeled #1, add 4 mL water.

In the dish labeled #2, add 2 mL water.

In the dish labeled #3, add 2 mL water.

In the dish labeled #4, add 2 mL water.

5. Place 4 tiny test tubes in a test tube rack. Obtain 10mL of acetone solution in a pipette. Dispense the acetone solution as follows:

In the first tiny test tube, add 2 mL acetone.

In a second tiny test tube, add 4 mL acetone.

In a third tiny test tube add, 2 mL acetone.

In a fourth tiny test tube add, 2 mL acetone.

6. With a timer ready, add the contents of tiny test tube #1 to dish #1.

Start timing the second you add the acetone. Mix the contents of the well with a stirring rod. Continue to stir until the reaction is complete. When the color disappears, record how many seconds (round off to the nearest second) elapsed from the time of mixing to time of reaction.

7. Repeat step #6 with tiny test tube 2 and dish #2.

Repeat step #6 with tiny test tube 3 and dish #3.

Repeat step #6 with tiny test tube 4 and dish #4.

8. Discard the solutions into the sink and rinse the dishes with water. Clean the marker off the dishes with acetone and a paper towel.

Data:

1. Create a data table in either Numbers or Excel:

Experiment	Time(sec)	HCl(M)	I ₂ (M)	Acetone(M)	Rate
1					
2					
3					
4					

Record the time in the table as you complete each experiment.

Questions:

1. Calculate the concentration of each solution. (Hint: each reaction had 2 or 4 mL diluted to 10 mL total. Use the dilution formula.) Add this to your data table created in Data #1.

2. Create a formula to calculate the rate of each reaction by dividing the concentration of the iodine for each experiment by the time in seconds. Add this to your data table created in Data #1.

3. Create a formula to calculate the order of the reaction with respect to acetone. (You will need to use logarithms, due to the fact that experimental data may not produce integer results). Round your answer to the nearest integer.

4. Create a formula to calculate the order of the reaction with respect to the HCl. (You will need to use logarithms, due to the fact that experimental data may not produce integer results). Round your answer to the nearest integer.

5. Create a formula to calculate the order of the reaction with respect to the iodine. (You will need to use logarithms, due to the fact that experimental data may not produce integer results). Round your answer to the nearest integer.

6. Create a formula to determine the rate constant (K) for this reaction for each trial.

1. Question Details

Lab Partners [1837468]

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

2. Question Details

Rate of Reaction Lab Data [1738053]

	Time (sec)	HCl(M)	I ₂ (M)	Acetone(M)	Rate (6 sig figs)
1	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text"/>
2	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text"/>
3	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text"/>
4	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text" value="4.0"/>	<input type="text"/>

Calculate the order with respect to acetone:(round to six significant figures)

Calculate the order with respect to the HCl: (round to six significant figures)

Calculate the order with respect to the Iodine: (round to six significant figures)

Determine the rate constant(K) for experiment 1 (Use the six sig fig values from the orders and rates.):

Determine the rate constant(K) for experiment 2 (Use the six sig fig values from the orders and rates.):

Determine the rate constant(K) for experiment 3 (Use the six sig fig values from the orders and rates.):

Determine the rate constant(K) for experiment 4 (Use the six sig fig values from the orders and rates.):

Determine the average value for the rate constant(K):

3. Question Details

Upload Spreadsheet [3606760]

Upload the spreadsheet you created or a photo of the spreadsheet. no file selected

It must be less than 5 MB in size.

Assignment Details

Name (AID): 12 Reaction Rate Lab (1777043)

Submissions Allowed: 7

Category: Homework

Code:

Locked: Yes

Author: Ryan, Matt (mryan@allsaintsschool.org)

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