KING SAUD UNIVERSITY
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(CHEM 335)

Chemical Kinetics

Laboratory Reports

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1447 H

Report No. (1): Catalytic Hydrogen Peroxide Decomposition

Student Names: …,……………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

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t (min)	V_{KMnO_4} (ml)	log (a-x)
5		
10		
15		
20		
25		

a) Plot a graph of log (a-x) on the Y-axis and (t) on the X-axis, then find:

The slope of the straight line is ……………………………………………………………………….

Reaction rate constant (k) is ……….………………………………………………………………….

b) Calculate the reaction half-life ($t_{1/2}$)

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Report No. (2): Catalytic Effect of Salt

Student Names: …,………………………………………………………………… Section No:…………..

Objectives:

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Reaction Balance Equations:

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Results and calculations:

Mixture number	1	2	3	4	5
(x) = Volume ($Na_2S_2O_3$) ml					
K					
log k					
I					
$\sqrt{I}$					

a) Calculate the concentrations of $K_2S_2O_8$, KI and NaCl in each mixture.

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b) Plot the relationship between log k on the y-axis and $\sqrt{I}$ on the x-axis, then find:

The slope of the straight line is ……………………………………………………………………

c) Write Example:

For the method of calculating (I):

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For the method of calculating (k):

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Report No. (3): Study of the autocatalysis of the reaction of potassium permanganate with oxalic acid.

Student Names: …,………………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

Time (min)	$Na_2S_2O_3$Volume for first mixture (ml)	$Na_2S_2O_3$ Volume for second mixture (ml)
5		
10		
15		
20		
25		

a) Plot the relationship between $Na_2S_2O_3$ volume (representing $KMnO_4$ volume) on the Y-axis and the corresponding time on the X-axis for each mixture, then find:
   - The initial concentration of ($KMnO_4$) for first mixture ………………..…
   - The initial concentration of ($KMnO_4$) for second mixture ……………
   - The half-life of the reaction for for first mixture ……………………..…
   - The half-life of the reaction for for second mixture …………………..…

b) Determine the order of the reaction

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Report No. (4): Adsorption of Oxalic Acid on Activated Charcoal

Student Names: …,……………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

M	V $_{NaOH}$	M`	x	$\frac{x}{m}$	$log\,\frac{x}{m}$	C	log (C)

a) Plot a graph of $\log\frac{x}{m}$ on the Y-axis against log (C) on the X-axis, then find:

The slope of the straight line is ……………………………………………………………………

log (k) value is ………………………………………………………………………………………

Reaction rate constant (k) is ……………………………………………………………………...

b) Write Example:

For the method of calculating (M_2).

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For the method of calculating (Ḿ).

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For the method of calculating (x).

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For the method of calculating (C).

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Report No. (5): Effect of Concentration on Reaction Rate

Student Names: …,……………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

a) Calculate the initial concentration of ($K_2S_2O_8$) at the beginning of the reaction (a)

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t (min)	V $_{Na_2S_2O_3}$ (ml)	X	(a-x)	ln (a-x)
5				
10				
15				
20				
25				

a) plot a graph of ln (a-x) on the Y-axis and (t) on the X-axis, then find:

The slope of the straight line is ………………………………………………………………………

Negative rate constant of the reaction (-k) ……………………………………………………………

b) Calculate the reaction half-life ($t_{1/2}$)

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Report No. (6): Saponificaion reaction of ester

Student Names: …,………………………………………………………… Section No:…………..

Objectives:

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Reaction Balance Equations:

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Results and calculations:

t (min)	X= V_{NaOH} (ml)	a -x	$\frac{1}{(a\ -\ x)}$
5			
10			
15			
20			
25			

a) plot a graph of $\frac{1}{(a-x)}$ on the Y-axis and (t) on the X-axis, then find:

The slope of the straight line is ………………………………………………………………………

Rate constant of the reaction (k) ……………………………………………………………………

b) Calculate the reaction half-life ($t_1/_2$)

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c) Why is this reaction called " Saponification Reaction"?

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Report No. (7): The Corrosion Rate

Student Names: …,……………………………………………………………… Section No:……………

Objectives:

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Results and calculations:

a) Explain how to calculate the volume, area, and density of samples only once in detail as follows:

Example - Sample No. (1):

Dimensions of Sample. Length = ... cm, Width = ...cm, Thickness = ...cm

Sample weight before corrosion = ... g = ... mg

Sample volume = ... cm^3

Sample Area = ... cm^2 = ... in^2

Sample Density = ... g/cm^3

Sample weight after corrosion = ... g = ... mg

Lost Weight = ... mg

Corrosion Rate = ... mpy

b) Write down your experiment results in the following table:

Beaker Symbol	Acid used and concentration	Length (cm)	Width (cm)	Area (inch^2)	Volume: (cm^3)	Density g/cm^3	Weight Before corrosion	Weight after corrosion	Lost mass (mg)	C.R (mpy)
a	3M HCl	....	....	....	....	....	....	....	....	....
b	3M HNO_3	....	....	....	....	....	....	....	....	....
c	2M HCl	....	....	....	....	....	....	....	....	....
d	2M HNO_3	....	....	....	....	....	....	....	....	....

c) From the results of your experiment, Which of the two acids under study causes the most corrosion of the metal? And what effect does the acid concentration have on the rate of corrosion?

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Report No. (8): Hydrolysis of Ester (ethyl acetate)

Student Names: …,…………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

t (min)	x	a-x	ln (a-x)
5			
10			
15			
20			
25			

a) plot a graph of ln (a-x) on the Y-axis and (t) on the X-axis, then find:

The slope of the straight line is ………………………………………………………………………

Rate constant of the reaction (k) ………………………………………………………………………

b) Calculate the reaction half-life ($t_1/_2$)

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Report No. (9): Measurement of the rate constant by electrical conductivity method

Student Names: …,……………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

t (min)	G_0 (S/cm)	G_t	$\frac{G_0 - G_t}{t}$
5	…………..	…………..	…………..
10		…………..	…………..
15		…………..	…………..
20		…………..	…………..
25		…………..	…………..

c) plot a graph of (Gt) on the Y-axis and ($\frac{G_0-G_t}{t}$) on the X-axis, then find:

The slope of the straight line is ……………………………………………………………………

Rate constant of the reaction (k) ……………………………………………………………………

d) Calculate the reaction half-life ($t_{1/2}$)

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Report No. (10): Kinetic study of the reaction of sulfite ion with iodate ion

Student Names: …,……………………………………………………………… Section No:……………

Objectives:

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Reaction Balance Equations:

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Results and calculations:

a) Write example for the method of calculating the concentration of (Na_2SO_3) in solution No. 1 :

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Solution No.	t (sec)	C (Na_2SO_3) mol/L	Log(C)	R= C/ t	log (R)
1					
2					
3					
4					

b) plot a graph of log (R) on the Y-axis and log (C) on the X-axis, then find:

The slope of the straight line ………………………………………………………………………..

The order of the reaction ……………………………………………………………………………..

The intercept of Y-axis ………………………………………………………………………………..

Rate constant of the reaction (k) ……………………………………..…………………………