جامعة الملك سعود
King Saud University
كلية العلوم
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CHEM 201

Laboratory Of General Chemistry (2)

Laboratory Reports

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1440-1439 H

Table of Contents

Student Names:
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Report No. (1)

Evaluation Of Error, Accuracy And Precision

The objectives of the experiment:
………………………………………………………………………………………………

Results and calculations

A. Part One

1.Tabulate the results:

m(g)	Δm

2. Calculate the experimental error.

3. Calculate error percentage.

4. Calculate the precision.

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B. Part two

1. Tabulate the results:

- **Graduated Cylinder**

m_{gc1} (g)	**m_{gc2} (g)**	**m_{gc3} (g)**
Accuracy of the mass value		
the average ($\bar{m}$)		
the experimental error (Δm)		
the percent error (m%)		

- **Graduated Burette**

$m_{burette1}$ (g)	**$m_{burette2}$ (g)**	**$m_{burette3}$ (g)**
Accuracy of the mass value		
the average ($\bar{m}$)		
the experimental error (Δm)		
the percent error (m%)		

Student Names:
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Report No. (2)

Determination Of The Density Using Different Methods

The objectives of the experiment:
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First method

If you have a cylindrical object, the weight of the mass of the body was taken and the dimensions were taken by the ruler. The measurements were as follows:

L (cm)	**D (cm)**	**M (g)**
3.6	**1.2**	**4.05**

Determination of density directly by calculation of volume and weighing mass of a geometric specimen

1. Calculate the volume of your specimen (massive cylinder).

2. Calculate the density of your specimen (massive cylinder).

3. Tabulate your errors of measurements:

Δ L (cm)	**Δ D (cm)**	**Δ m (g)**

4. Calculate the error in the density (Δdensity), and its accuracy:

Second method:

1. Report your measurements as follows:

V_1 (cm^3)	V_2 (cm^3)	m (g)
20		

2. Calculate the volume of your specimen (glass ball):

3. Calculate the density of specimen (glass ball):

4. Tabulate the values of experimental errors:

ΔV_1	ΔV_2	Δm

5. Calculate the error in the density (Δdensity), and its accuracy:

Third method

Weighted graduate cylinder-100 ml its mass (**m_{gc1}**) 250.08g. It was then filled 50 mL of water, Then a cylindrical sample was placed inside the cylinder and it was filled with saturated solution of the salt until the body was positioned in the midpoint of the cylinder the total volume of the solution remained in the cylinder is 65 ml, and the Weight the wide 100 mL-graduate cylinder with the remaining solution. its mass (**m_{gc2}**)310.55 g :

1.Calculate the mass of the solution (m solution):

2. Calculate the density of the solution which is at the same time equals that of the cylindrical specimen.

3. Tabulate the experimental errors on the mass and volume

Δ m	**Δ V**

4. Calculate the error in the density (Δdensity), and its accuracy:

Report No. (3)

Determination Of The Avogadro's Number Using The Monomolecular Film Method

Student Names:
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The objectives of the experiment :
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<u>Tabulate the results of your calculations in the following tables:</u>

	1	2	3
radius (cm)			
S (cm^2)			
e (cm)			
V (cm^3)			
$N_{A'}$			

<u>Calculate the following</u>:

a. The radius, r

b. The surface area, S

c. The thickness of the oil film (e)

d. The molar volume of oil, V_m

e. The volume of one molecule, V

f. The Avogadro number NA

g. Calculate the error in the value of Avogadro's number (ΔNA′) that you obtained

h. Compare your value of Avogadro's number, **NA′**, with the value of Avogadro's number

Report No. (4)

Reaction Stoichiometry: Determination Of The Limiting Reactant And Yield Percentage

Student Names:
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The objectives of the experiment:
…………………………………………………………………………………………..……….

The balanced equations for the reactions is:

…………………………………………………………………………………………………..

Results:

m $_{INITIAL}$/g	V $_{HCl}$/L	m $_{reactant}$/g	m $_{TOTAL(product)}$/g

Calculations:

1.The limiting reactant

Molecular weight of Na_2CO_3

- Mass of NaCl produced (m $_{NaCl}$) :

- Number of moles (n $_{Na2CO3}$) and (n $_{HCl}$) :

- n $_{Na2CO3}$ and n $_{HCl}$ must be divided by the coefficient of each reactants in the equation:

The limiting reactant is…………………………………

2.The yield percentage

- The actual mass of NaCl :

Molecular weight of NaCl

- Number of moles (nNaCl,actual):

- The yield percentage of NaCl:

Student Names:
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Report No. (5)

Determination Of The Transfered Thermal Energy:

Cooling A Metal And A Hot Tea

Objectives of experiment:
……………………………………………………………………………………........................

<u>Results and calculations:</u>

A. Part one

1. Tabulate your results as follows:

m_{water}	$T_{initial,water}$	m_{lock}	$T_{initial,\ lock}$	T_{final}

2. Given that c_{water} = 4.184 J/g ^{o}C, c_{lock} = 0.385 J/g ^{o}C and from your tabulated data, calculate the enthalpy changes, in the units of Joule:

- The heat gained by water.

- The heat lost by the nail.

3. Tabulate the values of errors:

Δm_{water}	$\Delta T_{initial,water}$	$\Delta\ m_{lock}$	$\Delta T_{initial,\ lock}$	ΔT_{final}

4. Calculate the error in the values of $\Delta H_{\ water}$ and the heat absorbed by the water.

5. Calculate the error in the values of ΔH_{lock} the heat released from the lock.

B. Part two

1. Tabulate your results as follows:

$m_{beaker1}$	$m_{beaker2}$	$T_{initial,\ tea}$	$T_{initial,\ water}$	T_{final}

2. Given that $c_{water} = c_{tea} = 4.184$ J/g ^{o}C, and from your tabulated data, calculate the enthalpy changes in the units of Joule as follows:

   - The heat gained by water.

   - The heat lost by tea.

3. Calculate the mass of water (m_{water}) you need to add to your tea in order to make the temperature of the tea low enough to be drinkable:

4. Tabulate the values of errors:

$\Delta m_{beaker1}$	$\Delta m_{beaker2}$	$\Delta\ T_{initial,\ tea}$	$\Delta T_{initial,\ water}$	ΔT_{final}

5. Calculate the error in the values of m_{water}

6. The mass of added water.

Student Names:
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Report No. (6)

Measuring the pH of a Solution

Objectives of experiment:
……………………………………………………………………………………..........................

Part One: Using HCl Solution.

A- Balance Equation:

……………………………………………………………………………………………

B- Results:

V_{NAOH}	PH
0	
5	
10	
15	
20	
22	
23	
24	
26	
27	
30	
35	
40	

C- Draw a curve between pH values and the volume added from NaOH and then from the curve determine:

- ✓ The volume of NaOH at equivalent point …………………………......
- ✓ pH value at equivalent point …………………………………………

D- Calculations :

- Molarity of HCl

- Normality

- Molecular weight of HCl

- Strength of Concertation

Part two: Using CH_3COOH Solution.

A- Balance Equation:

…………………………………………………………………………………………

B- Results:

V_{NAOH}	PH
0	
5	
10	
20	
25	
28	
29	
30	
31	
32	
35	
40	
45	

C- Draw a curve between pH values and the volume added from NaOH and then from the curve determine :

- ✓ The volume of NaOH at equivalent point …………………………......
- ✓ pH value at equivalent point …………………………………………

D- Calculations :

- Molarity of CH_3COOH

- Normality

- Molecular weight of CH_3COOH

- Strength of Concertation

Student Names:
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Report No. (7)

Determining the Rate Law for the Reaction of Hydrogen Peroxide with Iodide

Objectives of experiment:
………………………………………………………………………………..........................

Balance Equation:

……………………………………………………………………………………….

Results and calculations:

Expt #	H_2O_2 (mL)	Moles of [H_2O_2] used	V (L) Total volume of solution	[H_2O_2] used	Time (s)	Rate (M\s)
1	10		0.2			
2	10		0.2			
3	10		0.2			
4	10		0.2			
5	20		0.2			
6	30		0.2			
7	40		0.2			

Moles of [H_2O_2] used: [H_2O_2]:

Expt #	Log Rate	H_2O_2 (mL)	Initial Moles of [H_2O_2]	V (L) Total volume of solution	[H_2O_2]	Log [H_2O_2]
4		10		0.2		
5		20		0.2		
6		30		0.2		
7		40		0.2		

Initial Moles of [H_2O_2]: [H_2O_2]:

Draw the relationship between Log [H_2O_2] and Log Rate

The low is…………………………………………………

Expt #	Log Rate	KI (mL)	Initial Moles of [I]	V (L) Total volume of solution	[I]	Log [I]
1		4		0.2		
2		6		0.2		
3		8		0.2		
4		12		0.2		

Initial Moles of [I]: [I]:

Draw the relationship between Log [I] and Log Rate

The low is………………………………………………