NAME……INDEX NO…….

SCHOOL…… ….SIGNATURE……..

233/3

CHEMISTRY

PAPER 3 (PRACTICAL)

2 HOURS

JULY /AUGUST

LAICOMET FORM FOUR EXAM

233/3

CHEMISTRY

PAPER 3

INSTRUCTION TO CANDIDATES

1. Write your name and index number in the spaces provided above.
2. Answer all the questions in the spaces provided
3. Mathematics tables and electronic calculators may be used
4. ALL working Must be clearly shown where necessary .
5. In the first 15 minutes read through the questions and ensure that you have all the apparatus and other substances you need..

FOR EXAMINERS USE ONLY

Questions	Maximum score	Candidates score
1	21	
2	08	
3	11	

You are provided with:

– Solution A, containing 4.0gdm^{-3} of sodium hydroxide

– solution B, hydrochloric acid

– 2.5 g of a mixture of two salts, xcl (RFM 58.5) and CO_3 (RFM 106)

You are required to:

i) Standardize solution B, hydrochloric acid.

ii) Determine the mass composition of the salt mixture

PROCEDURE 1

1. Fill the burette with solution B
2. Pipette solution A into a clean dry conical flask. Then add 2 -3 drops of phenolphthalein indicator.
3. Titrate solution A solution with solution B. Record your results in the table below.
4. Repeat the procedure two more times to retain concord and values.

TABLE 1

Titration number	1	2	3
Final burette reading (cm^3)			
Initial burette reading(cm^3)			
Volume of acid used (cm^3)			

a. Calculate the average volume of solution B used. (1mk)

b. Find;

i Moles of sodium hydroxide that reacted with the acid (2mks)

ii Moles of hydrochloric acid present in the average volume (1mk)

iii Molarity of the acid (1mk)

PROCEDURE II

1. Put about 100cm^3 of water in a 250ml volumetric flask add all the 2.5g of salt mixture. Shake the mixture to dissolve and the solid. Top up the solution to the mark with distilled water Label this solution C
2. Fill this burette with solution B.
3. Pipette 25c m^3 of solution C and put it into a clean conical flask. Add 3 drops of methyl orange indicator.
4. Titrate solution C with solution B. Record your results in the table below.
5. Repeat the titration two more times

TABLE II

TITRATION	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution B used (cm^3)			

c. Calculate the average volume of solution B (1mk)

d. Calculate the number of moles in the hydrochloric acid used (1mk)

e. The equation for the reaction of the acid with one of the salts in the mixture is;

$$2\,HCL_{(aq)} + X_2CO_{3(s)} \rightarrow 2XCL_{(aq)} + CO_2(g) + H_2O_{(l)}$$

Calculate;

i Moles of X_2CO_3 that reacted with the acid in the experiment

(1mk)

ii Molarity of X_2CO_3 (2mks)

f. Calculate the mass of the salt mixture in grammes dm^{-3} (1mk)

g. Calculate the percentage of xcl in this mixture (2mks)

2. In this experiment, you're required to determine the time takes for a precipitate to be formed when S_3 which is sodium thiosulphate solution , reacts with dilute hydrochloric acid.

PROCEDURE

1. Using a measuring cylinder measure 50cm^3 of S^3 into a 100ml beaker.
2. Make a pencil cross on a white piece of paper so that when a beaker is placed top of the paper , the cross can be seen through the bottom of the beaker.
3. To solution A add 10 cm^3 of 2M hydrochloric acid and at the same time start a stop watch / stop clock. Swirl the contents of the beaker twice and then place it over the cross on the paper . Look at the cross from above the beaker through the mixture. Stop the stop watch immediately the precipitate makes the cross invisible . Record time taken for the cross to become invisible in the table below, rinse beaker .
4. Repeat the procedure with solutions B,C,D and E.as per the table.

SOLUTION	**Volume of**	**Volume of water**	**Volume of 2M**	**Time taken in**

	solution S_3 in the beaker (cm^3)	**added (cm^3)**	**HCL**	**seconds**
A	50	0	10	
B	40	10	10	
C	30	20	10	
D	20	30	10	
E	10	40	10	

a. Plot the graph of volume of solution S_3 (Y – axis)against time (4mks)

5. a) From the graph state the relationship between concentration of solution S_3 and time.

(1mk)

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b) Why is water added to the S_3 (1mk)

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3. You're provided with solid D. Carry out the tests shown below on the solid.

a. Heat a spatula full of D in A clean dry test – tube.

Observation	Inference
(1 mk)	(½ mks)

b. Put a spatula end- full of D in a boiling tube. Half fill it with water. shake this mixture.

Observation	Inference
(½ mks)	(½ mks)

c Divide the resultant mixture in (b)above into 5 portions

i. To the first portion add dilute nitric acid followed by a few drops of Barium nitrate

Observation	Inference
(1mk)	(1mk)

ii. To the second portion, add nitric acid a few drops followed by lead (ii) nitrate and then warm the mixture.

Observation	Inference
(1mk)	(½ mk)

iii To the third portion, add sodium hydroxide solution drop wise until in excess. Warm this mixture. Test any gas produced withy Litmus paper

Observation	Inference
(½ mk)	(½ mk)

d. You are provided with liquid B . Carry out the tests shown below and write your observations and inferences in the spaces provided:

iv

i. To about $1cm^3$ of liquid B in a test – tube , add about $1cm^3$ of distilled water and shake the mixture.

Observation	Inference
(½ mk)	(½ mk)

ii. To about $1cm^3$ of liquid B in a test tube add a small amount of solid sodium hydrogen carbonate

Observation	Inference
(½ mk)	(½ mk)

iii. To about $2cm^3$ of liquid B in A test – tube, add about $1cm^3$ of acidified potassium dichromate (vi) . Warm the mixture gently and allow it to stand for about one minute.

Observation	Inference
(1mk)	(1mk)