Name...Index No................./........

Candidate's Signature.......................

Date:..

233/3

PRE-MOCK
MARCH - APRIL

Kenya Certificate of Secondary Education

CHEMISTRY
PRACTICAL
PAPER 3
TIME: 2¼ HOURS

INSTRUCTIONS TO CANDIDATES

➢ *Answer all questions in the spaces provided in this question paper.*
➢ *You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.*
➢ *Mathematical tables and electronic calculators may be used.*
➢ *All workings must be clearly shown where necessary.*

For examiners use only

Questions	Maximum score	Candidates score
1	22	
2	09	
3	09	
TOTAL	40	

This paper consists of 5 printed pages.
Candidates should check the question paper to ensure that all the pages are printed as indicated and that no questions are missing.

1

1. You are provided with:
Sulphuric (VI) acid solution J
0.5M sodium hydroxide solution K
Magnesium ribbon labeled N.

You are required to:
(i). Investigate the rate of reaction between solution J and metal N
(ii). Determine the concentration of sulphuric (VI) acid in grams per litre.

PROCEDURE I

(i). Using a ruler, make six marks at 2cm length interval on the magnesium ribbon provided. Cut of six equal pieces each 6 cm long
(ii). Transfer $50.0cm^3$ of acid solution using a measuring cylinder into a clean dry 100ml beaker. Place 2.0cm length piece of magnesium ribbon into the beaker with the acid and immediately start a stop watch clock. Shake gently an note the time taken to for the piece of magnesium ribbon to react completely.
(iii). Record in table I below. Place another piece of magnesium ribbon 2 cm to the same solution and again note the time taken.
(iv). Repeat the procedure until all six pieces of magnesium ribbon have reacted with the same solution initially placed in the beaker.

KEEP THE SOLUTION OBTAINED IN THIS EXPERIMENT FOR USE IN PROCEDURE II

(vi). At the same time record the temperature of the solution at the time when magnesium ribbon just disappears.
(vi). Complete the table below.   (3 marks)

Table I

Piece of magnesium added	1	2	3	4	5	6
Time taken (seconds)						
Reciprocal of time 1/t (S^{-1})						
Temperature of mixture (^{o}C)						
Length of magnesium added	2	4	6	8	10	12

(b) (i). Plot a graph of total length of magnesium ribbon added against reciprocal of time for the reaction to go to completion.   (3 marks)

(ii). From your graph find the reciprocal of time when 4.5 cm length of magnesium ribbon reacts completely.   (1mark)

....
....

(iii). Given that the mass of solid N that reacted was 0.12g and that the atomic mass of magnesium is 24.0g determine the number of moles of sulphuric (VI) acid that were used during the reaction.

(1marks)

....

....

....

....

(iv). Calculate the mass per unit length of magnesium ribbon provided. (1mark)

....

....

....

(c) (i). Record the initial temperature of the acid before addition of the first piece of the magnesium ribbon.

(1mark)

....

....

(ii). From your answers in the table above and the answer in (c) (i) above find Δt and hence the enthalpy change for the reaction between the magnesium ribbon and the acid. (1mark)

....

....

....

....

....

....

(iii). Calculate the molar enthalpy change for the reaction. (1mark)

....

....

....

....

....

....

PROCEDURE II

Place all the solution obtained in procedure I in a clean 250ml volumetric flask. Add distilled water to make 250cm³ solution.

Transfer all the solution into a beaker and shake well. Label it solution M
Fill the burette with solution K.
Pipette 25.0 cm³ of solution M into a conical flask. Add 2-3 drops of phenolphthalein indicator and titrate with solution K. Record your results in the table II below. Repeat the titration to obtain consistent values.

Table II

(3 marks)

Titration	1	2	3
Final burette reading (cm³)			
Initial burette reading (cm³)			
Volume of solution K used (cm³)			

(d). Determine the average volume of solution K used. (1mark)

....

....

....

(e). Calculate the number of moles of sodium hydroxide solution K used. (1mark)

....

....

....

....

(f). Calculate:
(i) the number of moles of sulphuric (VI) acid in 25.0 cm³ of solution M. (1mark)

....

....

....

(ii) The number of moles of sulphuric (VI) acid in 100 cm³ of solution M. (1mark)

....

....

....

....

4

(g). Using the result in (b) (iii) and (f) (ii) above, calculate the total number of moles of sulphuric (VI) acid in 50.0cm^3 solution J.

(1mark)

....

....

....

(h). Calculate the concentration of the original sulphuric (VI) acid in moles per litre.   (2 marks)

....

....

....

....

....

....

2. You are provided with 10cm^3 of solution **H**.
Solution H contains two cations and two anions. Carry out the tests below and record your observations and inferences in the spaces provided.

(a) Add 15cm^3 of 2M sodium hydroxide to all of solution H provided. Shake well. Filter the mixture into a boiling tube. Retain the filtrate.

OBSERVATIONS	INFERENCES
(1mark)	(1mark)

(b). To about 2cm^3 of the filtrate add 2M nitric acid dropwise until in excess. Retain the mixture.

OBSERVATIONS	INFERENCES
(1mark)	(1mark)

Divide the mixture in (b) (i) above into two portions.
(ii) to the first portion add aqueous sodium hydroxide solution till in excess.

OBSERVATIONS	INFERENCES
(1mark)	(1mark)

5

(iii). To the second portion add aqueous ammonia dropwise till in excess.

OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(c). To 2cm³ of the filtrate, add 4 drops of acidified barium chloride

OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(d). To 2cm³ of the filtrate add about 1cm³ of aqueous sodium hydroxide followed by a small piece of aluminium foil. Warm the mixture gently and carefully. Identify any gases evolved using litmus papers.

OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

3. You are provided with **liquid G**. Carry out the tests below. Record your observations and inferences in the spaces provided

(a). Place three or four drops of liquid G on a watch glass. Ignite the liquid using a Bunsen burner.	
OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(b) To about 1cm^3 of liquid G in a test tube, add about 1 cm^3 of distilled water and shake.	
OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(c). To about 1 cm^3 of liquid G in a test tube, add a small amount of solid sodium carbonate	
OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(d). To about 1 cm^3 of liquid G in a test tube, add 3 drops of universal indicator solution.	
OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(e). To about 2 cm^3 of liquid G in a test tube, add 3 drops of acidified potassium manganate (VII).	
OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(f). To about 2 cm^3 of liquid G in a test tube, add 3 drops of bromine water	
OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

7

(g). To about 2 cm³ of liquid G in a test tube, add about 1 cm³ of solution R [acidified potassium dichromate (VI)]. Warm the mixture gently and allow it to stand for about 1 minute.

OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

(h). To about 2 cm³ of G add the whole of solution S [Ethanoic acid with 3 drops of concentrated sulphuric (VI) acid].

OBSERVATIONS	INFERENCES
(½ mark)	(½ mark)

NYAMBARE SECONDARY SCHOOL
PRE-MOCK
MARCH - APRIL

Kenya Certificate of Secondary Education

CHEMISTRY PRACTICAL
PAPER 3 CONFIDENTIAL

- About 50 cm^3 of 2M sulphuric (VI) acid solution labeled J;
- About 60 cm^3 of 0.5M sodium hydroxide solution;
- 12 cm long magnesium ribbon;
- A 100ml measuring cylinder;
- A 10ml measuring cylinder;
- A 100ml glass beaker;
- A stop watch/ clock;
- A burette;
- A 25 cm_3 pipette;
- A clamp;
- Phenolphthalein indicator;
- A 110°C thermometer;
- Distilled water;
- 2 conical flasks;
- A white tile;
- Solution **H** in a boiling tube: 10 cm^3 of solution made by mixing 75g of hydrated copper (II) sulphate with 15g of zinc nitrate and dissolving the mixture in 800cm^3 of distilled water and making it to 1 litre of solution;
- Solution G: 12 cm3 of absolute ethanol.
- Filter paper and funnel;
- Blue and red litmus paper strips;
- A wooden splint;
- Means of heating;
- 5 clean dry test tubes;
- A piece of aluminium foil;
- Test tube folder;
- A pH chart;

Bench solutions.
- Sodium hydroxide solution
- Aqueous ammonia
- 2M nitric (V) acid
- Acidified barium chloride solution.
- Bromine water;
- Acidified potassium manganate (VII);
- Solution **R** [acidified potassium dichromate (VI)]
- Solution **S** [Ethanoic acid with 3 drops of concentrated sulphuric (VI) acid].
- Universal indicator solution;