Name .... **Index Number** ....

School .... **Candidate's Signature** ....

233/3 **Date** ....

CHEMISTRY

(PRACTICAL)

Paper 3

2015

2¼ hours

MAKUENI COUNTY KCSE 2015 PREPARATORY EXAMINATION

Kenya Certificate of Secondary Education

CHEMISTRY

Paper 3

(PRACTICAL)

2¼ hours

Instructions to candidates

(a) *Write your name and index number in the spaces provided above.*

(b) *Sign and write the date of examination in the spaces provided above.*

(c) *Answer **ALL** the questions in the spaces provided in the question paper.*

(d) *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.*

(e) *All working **MUST** be clearly shown where necessary.*

(f) *KNEC mathematical tables and silent electronic calculators may be used.*

(g) ***This paper consists of 7 printed pages.***

(h) ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

(i) ***Candidates should answer the questions in English.***

For Examiner's Use Only

Questions	Maximum Score	Candidate's Score
1	25	
2	15	
Total Score	40	

Sponsored by H.E. Prof. Kivutha Kibwana, Governor, Makueni County

1. You are provided with:

- Solution Q Sulphuric (VI) acid
- Magnesium ribbon labelled solid R
- 1.5M sodium hydroxide – solution S
- Phenolphthalein indicator

You are required to:

(i) Determine the rate of reaction between magnesium ribbon – solid R and sulphuric (VI) acid solution Q.

(ii) Determine the concentration of sulphuric acid in moles per litre.

(a) **Procedure I**

(i) Using a measuring cylinder, measure 50 cm^3 of solution Q and transfer it into a clean 100 ml beaker.

(ii) Use a ruler and scalpel/knife to cut out five pieces, each of exactly 1 cm length of magnesium ribbon.

(iii) Place one piece of magnesium into the beaker containing solution Q and start a stop clock/watch immediately. Swirl the beaker gently ensuring that the piece is always inside the solution. Record in the table the time taken for the magnesium ribbon to disappear.

(iv) Repeat procedure (iii) for each of the remaining 4 pieces to the same solution Q and complete Table 1 below.

N/B: Keep solution Q for use in Procedure II.

(b) Table 1

Total length of Solid R added (cm) (Magnesium ribbon)	1	2	3	4	5
Time taken in seconds					
Rate of reaction = $\frac{1}{\text{time}}$					

(6 marks)

(c) (i) Plot a graph of rate of reaction $\frac{1}{\text{time}}$ (y-axis) against length of solid R added. (3 marks)

Graph

(ii) Use the graph to determine the time that would be taken for 3.5 cm of solid R to disappear. (2 marks)

....

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(iii) In terms of rate of reaction, explain the shape of your graph. (1 mark)

....

(d) Given that the mass of solid R used was 0.13 g and relative atomic mass of magnesium is 24, calculate the number of moles of solution Q that were used up during the reaction. (2 marks)

(e) **Procedure II**

(i) Place all the solution obtained in Procedure I in 100 ml measuring cylinder. Add distilled water to make 100 cm^3 of solution in the measuring cylinder. Transfer this solution into a 100 ml beaker and stir well. Label this solution T.

(ii) Fill the burette with solution S. Using a pipette and a pipette filler, place 25.0 cm^3 of solution T into a conical flask. Add 2 – 3 drops of phenolphthalein indicator into solution T and titrate it with solution S. Record your readings in Table 2. Repeat the titration two more times and complete Table 2.

Table 2

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution S used (cm^3)			

(4 marks)

(iii) Calculate the:

I. Average volume of solution S used. (1 mark)

II. Number of moles of sodium hydroxide – solution S used. (1 mark)

III. Number of moles of sulphuric (VI) acid in 25.0 cm^3 of solution T. (1½ marks)

IV. Number of moles of sulphuric (VI) acid in 100 cm^3 of solution T. (1 mark)

(iv) Using your answer in 1 (d) above, determine the number of moles of sulphuric (VI) acid in 50 cm^3 of solution Q. (1½ marks)

(v) Calculate the concentration of the original sulphuric (VI) acid – solution Q – in moles per litre. (1 mark)

2. You are provided with solid U. Carry out the following tests on it and record your observations and inferences.

(a) Using a spatula, put about half of solid U provided into a boiling tube. Add 20 cm^3 of distilled water and shake well.

Observations	**Inferences**
2 marks	1 mark

(b) Divide solution formed in (a) into five portions of 2 cm^3 each in separate test tubes.

(i) To the first portion add ammonia solution dropwise till in excess.

Observations	**Inferences**
1 mark	1 mark

(ii) To the second portion add 2 cm^3 of sodium sulphate solution.

Observations	**Inferences**
1 mark	1 mark

(iii) To the third portion add 2 cm^3 of lead (II) nitrate solution.

Observations	**Inferences**
1 mark	1 mark

(iv) To the fourth portion add 2 cm^3 of barium nitrate solution.

Observations	**Inferences**
1 mark	2 marks

(v) To the fifth portion dip blue and red litmus papers.

Observations	**Inferences**
1 mark	1 mark