

Name.....

Index No.

School

233/3

CHEMISTRY

PAPER 3

(PRACTICAL)

TIME: 2 ¼ HOURS

Kenya Certificate of Secondary Education (K.C.S.E)

Instructions to Candidates:

- Write your name and index number in the spaces provided above.
- Answer all the questions in the spaces provided in the question paper.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ 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.
- All working **MUST** be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

For examiner's use only.

| QUESTION | MAXIMUM | SCORE |
|--------------------|-----------|-------|
| 1 | 25 | |
| 2 | 15 | |
| Total score | 40 | |

This paper consists of 8 printed pages.

Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

1. You are provided with:
- Solution Q sulphuric 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 acid solution Q
- (ii) Determine the concentration of sulphuric acid in moles per litre.

(a) Procedure I

- I. Using a measuring cylinder, measure 50cm³ of solution Q and transfer it into a clean 100ml beaker.
- II. Use a ruler and scapel / knife to cut out five pieces, each of exactly 1cm 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.

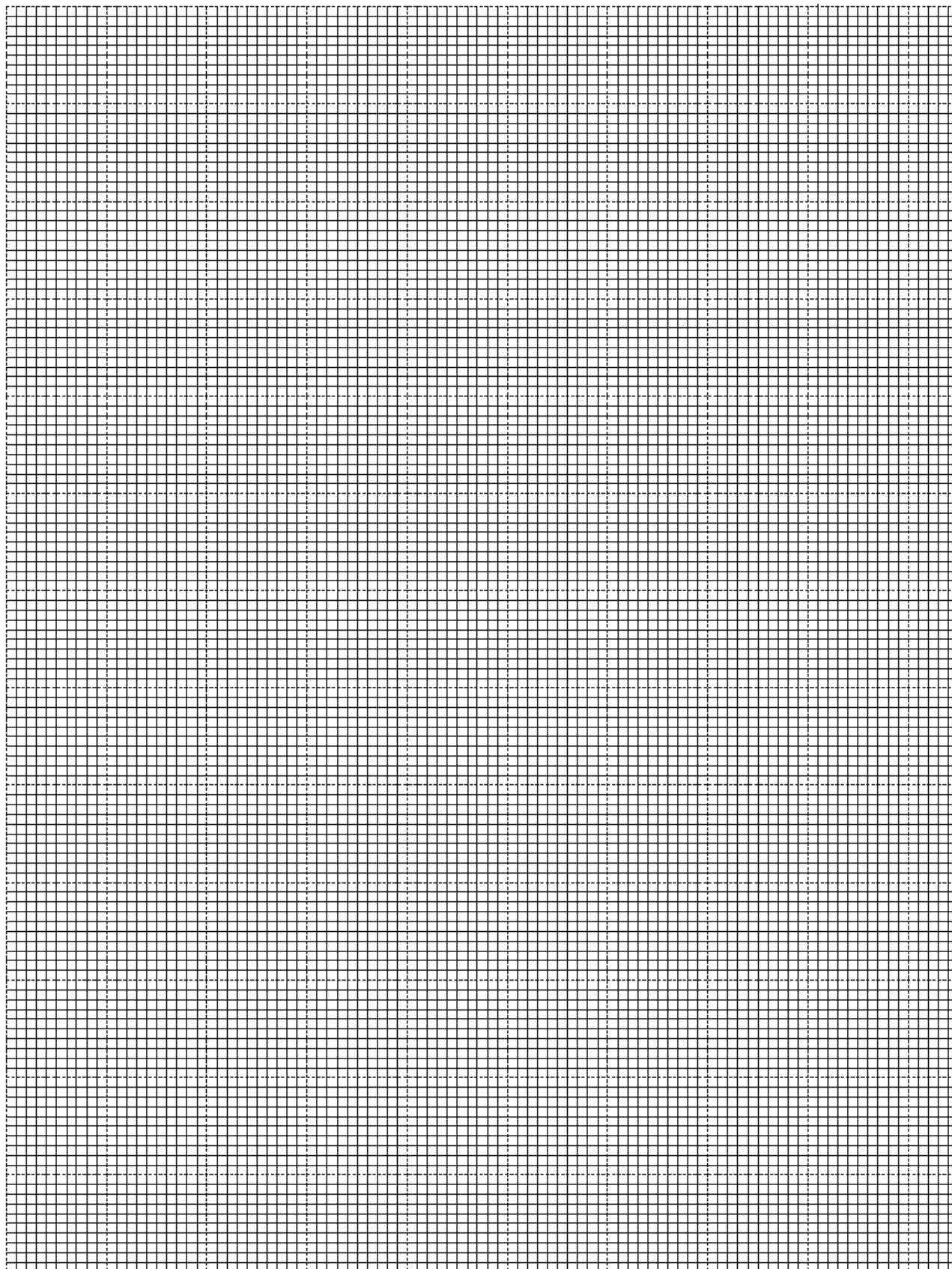
N/B: Keep solution Q for use in procedure II

b) Table 1

| | | | | | |
|--|---|---|---|---|---|
| Length of solid R added cm (Magnesium ribbon) | 1 | 2 | 3 | 4 | 5 |
| Time taken in seconds | | | | | |
| Rate of reaction = $\frac{1}{\text{time}}$ | | | | | |

(6mks)

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



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

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

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

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e) Procedure II

(i) Place all the solution obtained in procedure I in 100ml measuring cylinder. Add distilled water to make 100cm³ of solution in the measuring cylinder. Transfer this solution into a 100ml beaker and stir well. Label this solution T.

(ii) Fill the burette with solution S. Using a pipette and a pipette filler, place 25.0cm³ 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.

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

(4mks)

(iii) Calculate the :

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

- a) Using a spatula put about half of solid U provided into a boiling tube. Add 20cm³ of distilled water and shake well.
- b) Divide solution formed in (a) into five portions of 2cm³ each in separate test tubes.
- (i) To first portion add ammonia solution dropwise till in excess.

| Observations | Inferences |
|--------------|------------|
| (1mk) | (1mk) |

- (ii) To the second portion add 2cm³ of sodium sulphate solution.

| Observations | Inferences |
|--------------|------------|
| (1mk) | (2mks) |

- (iii) To the third portion add 2cm³ of lead (II) nitrate solution.

| Observations | Inferences |
|--------------|------------|
| | |

| | |
|-------|-------|
| (1mk) | (2mk) |
|-------|-------|

(iv) To the fourth portion add 2cm³ of Barium nitrate solution.

| Observations | Inferences |
|--------------|------------|
| (1mk) | (2mk) |

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

| Observations | Inferences |
|--------------|------------|
| (1mk) | (1mk) |

