

KENYA CERTIFICATE OF SECONDARY EDUCATION
ACK DIOCESE OF MUMIAS JOINT EVALUATION EXAMINATIONS
-FORM 4-

233/3

- **CHEMISTRY** -
(PRACTICAL)

Paper 3

September 2022- 2¹/₄ Hours

Name Index Number

School..... Date.....

INSTRUCTIONS TO CANDIDATES

- Answer all the 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 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.
- Candidates should answer questions in English.

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	24	
2	09	
3	07	
TOTAL SCORE	40	

This Paper Consists of Seven Printed Pages

1. You are provided with:

- 0.1M Sodium hydroxide, **Solution F**
- **Solution G** made by dissolving 12.6g of dibasic acid, $H_2J_2O_4$, in 250cm³ of distilled water.
- 0.02M acidified potassium manganate (vii), **Solution N**.

You are required to:

- Dilute Solution G
- Standardize the resulting dilute solution using sodium hydroxide Solution F
- Determine the mass of J in the formula $H_2J_2O_4$
- Determine the rate of reaction between solution G and solution N at various temperatures.

Procedure I

- Using a measuring cylinder measure 20cm³ of solution G and transfer into a beaker.
- Measure 80cm³ of distilled water and add it to the 20cm³ of solution G in the beaker. Label this solution H.
- Place solution H in a burette. Pipette 25cm³ of solution F into a 250cm³ conical flask. Add 2 drops of phenolphthalein indicator and titrate with solution Record your results in table 1. Repeat the titrations two more times and complete table 1.

a) **Table 1** (4 marks)

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

b) Calculate the average volume of solution H used (1 mark)

c) Determine the number of moles of:

i. Sodium hydroxide, Solution F used. (1 mark)

ii. The acid, solution H used (2 marks)

iii. Acid in 100cm^3 of solution H (1 mark)

iv. Acid in 20cm^3 of solution G (1 mark)

v. Acid in 250cm^3 of solution G (1 mark)

d) Calculate the:

i. Molar mass of acid $\text{H}_2\text{J}_2\text{O}_4$ (2 marks)

ii. Mass of J in the formula given $\text{H}_2\text{J}_2\text{O}_4$ that H=1 and O=16 (1 mark)

Procedure II

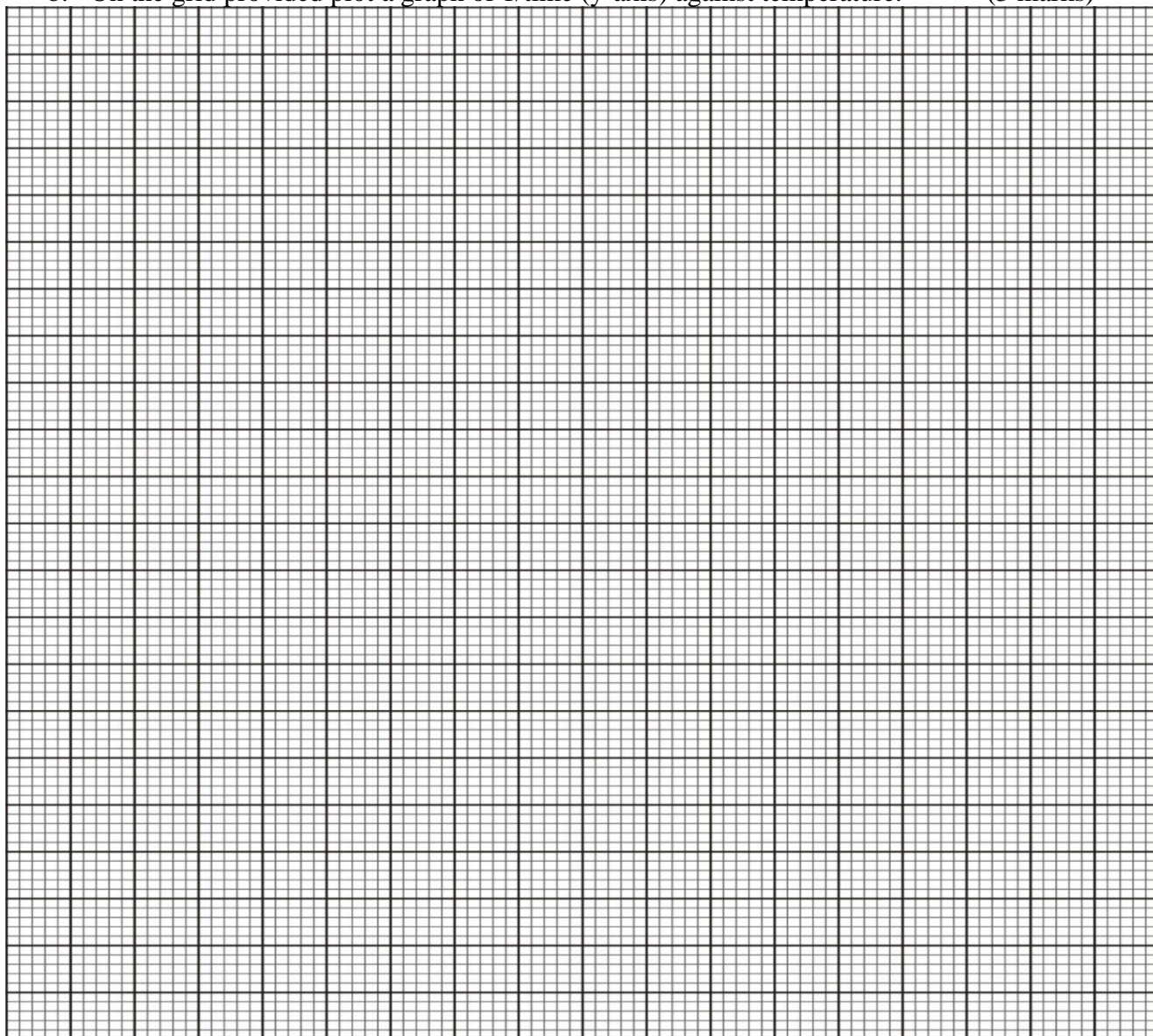
- I. Place 5cm^3 of solution N in a boiling tube.
- II. Place another 5cm^3 of solution G in a boiling tube
- III. Heat solution N on a Bunsen burner flame to 80°C . Allow it to cool to 70°C . Note that care should be taken to prevent breaking of the thermometer.
- IV. Add all solution G into solution N and immediately start a stopwatch.
- V. Stir the mixture using a thermometer and record the time taken for the purple colour to disappear.
- VI. Clean the boiling tubes and repeat the procedure by allowing solution N to cool to 60°C , 50°C , 40°C and complete Table 2 below.

a. Table II

(5 marks)

Temperature, $^\circ\text{C}$	70	60	50	40
Time taken for purple colour to disappear (s)				
Reciprocal of time, $1/\text{time}(\text{s}^{-1})$				

b. On the grid provided plot a graph of 1/time (y-axis) against temperature. (3 marks)



c. From the graph determine the time taken for the purple colour to disappear at 45⁰C (1 mark)

d. State the relationship between the rate of reaction and temperature at which purple colour disappears. (1 mark)

2. You are provided with **solid P**. Put all solid P in a clean boiling tube and add about 10cm³ of distilled water and stir. Divide mixture into four portions.

Observation	Inference
1mark	1 mark

I. To the first portion, add sodium hydroxide dropwise until in excess.

Observation	Inference
1mark	1 mark

II. To the second portion, dip a glass rod and burn in a non-luminous flame

Observation	Inference
¹ / ₂ mark	1 mark

III. To the third portion, add 2 drops of Barium nitrate

Observation	Inference
¹ / ₂ mark	1 mark

IV. To the fourth portion add 2 drops of acidified potassium manganate (vii)

[**Solution N**] using the dropper provided.

Observation	Inference
1mark	1 mark

3. You are provided with **Solid R**. Carry out the following tests and record your observations and inferences in the tables below.

i. Using a clean metallic spatula, burn about one third of solid R in a non-luminous flame

Observation	Inference
1 mark	1 mark

ii. Dissolve the remaining solid R in about 10cm³ distilled water in a test tube and divide the solution into 3 portions.

To the first portion add 2 drops of potassium manganate (vii) [**Solution N**] using the dropper provided.

Observation	Inference
1mark	1 mark

iii. To the second portion add two drops of bromine water.

Observation	Inference
¹ / ₂ mark	1 mark

iv. To the third portion add sodium carbonate provided.

Observation	Inference
¹ / ₂ mark	1 mark

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