



233/ 3

Paper 3

Chemistry - (Practical )

POST MOCK,  
2024

T2 -2024 – 2 ½ hours

Name ..... Adm Number.....

Candidate's Signature ..... Date ...../...../.....

**INSTRUCTIONS TO CANDIDATES**

1. Write your name and index number in the spaces provided.
2. Sign and write the date of examination in the spaces provided.
3. Answer ALL the questions in the spaces provided in the question paper
4. 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 required.
5. ALL working MUST be clearly shown where necessary
6. Mathematical tables and electronic calculators may be used.

**FOR EXAMINERS USE ONLY**

QUESTION	Max Score	Candidate Score
1	22	
2	11	
3	07	
TOTAL	40	



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1. You are provided with;

- Solution **A**: 0.02M acidified potassium manganate (VII) solution.
- Solution **B**, which is prepared by dissolving 5.88g of ammonium iron (II) sulphate in 250cm<sup>3</sup> of distilled water.
- Solution **C**: 0.25M oxalic acid.

You are required to:

- Determine the number of moles of **B** that react with one of potassium manganate (VII)
- Determine the rate of reaction between solution **C** and **A** at different temperatures.

**Procedure I.**

Fill the burette with solution **A**. using a clean pipette, place 25.0cm<sup>3</sup> of solution **B** into a clean conical flask, and titrate with solution **A** until the solution becomes permanent pink. Record your results in table I below. Repeat the procedure two more times to complete table I.**(RETAIN THE REMAINING SOLUTION A FOR USE IN PROCEDURE II)**

a) Table I.

	<b>I</b>	<b>II</b>	<b>III</b>
Final burette reading(cm <sup>3</sup> )			
Initial burette reading (cm <sup>3</sup> )			
Volume of solution <b>A</b> used. (cm <sup>3</sup> )			

(4 marks)

b) Calculate the:

- Average volume of solution **A** used. (1 mark)

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- Number of moles of solution **A** used. (1 mark)

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- Concentration of solution **B** in moles per litre. (RFM of **B** is **392**) (1 mark)

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- c) Calculate the number of moles of **B**:  
 (i) In 25.0cm<sup>3</sup> of solution. (1 mark)

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- (ii) Which react with one mole of solution **A**( Acidified potassium manganite (VII) ) (1 mark)

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**Procedure II.**

Place 5 test tube on a test tube rack. Fill the burette with solution **A**. To each test tube place 10.0cm<sup>3</sup> of solution **A** from the burette. Using a clean 10ml measuring cylinder, place 10.0cm<sup>3</sup> of solution **C** into a clean boiling tube. Insert a thermometer in solution **C** in the boiling tube. Heat solution **C** in the warm water bath until it attains a temperature of **40°C**.

Remove the boiling tube from the water bath and place it in a test tube rack. Add the first portion of solution **A** and immediately start a stop watch. Record the time taken for the purple colour of the mixture to decolourise in table 2 below. Repeat the experiment by using 10.0cm<sup>3</sup>of solution **C** at temperature of **40°C, 50°C, 60°C, 70°C and 80°C**.Record the time taken in each case in table 2 below.

- d) Table 2

Temperature	40	50	60	70	80
Time taken in seconds					
$\frac{1}{Time}$ (sec <sup>-1</sup> )					

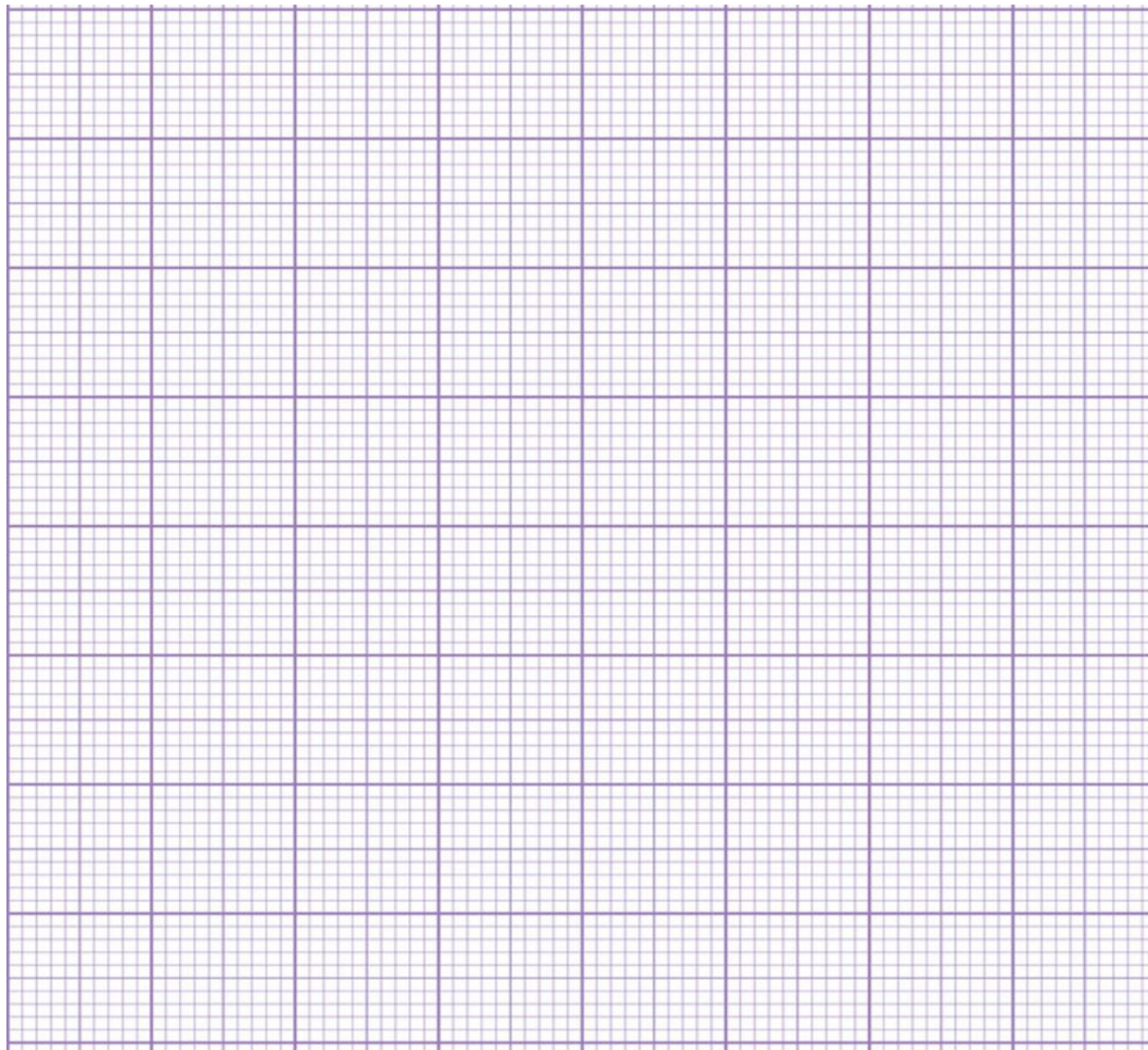
(3½ marks)

- e) Complete the table by computing  $\frac{1}{Time}$  (sec<sup>-1</sup>) (2½ marks)

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f) Plot a graph of  $\frac{1}{\text{Time}}$  ( $\text{sec}^{-1}$ ) against temperature.

(3 marks)



g) From the graph determine the time that would be taken if the temperature was  $52.0^{\circ}\text{C}$ . (1 mark)

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h) How does the rate of reaction of acidified potassium manganate (VII) with oxalic vary with temperature? (1 mark)

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2. You are provided with solid **P** which is a mixture of two salts. You are required to carry out the tests below on solid **P**. Write your observations and inferences in the spaces provided.

(a) Place the entire solid in a boiling tube. Add about 10cm<sup>3</sup> of distilled water and shake. Filter the mixture. Retain both the residue and the filtrate.

Observation	Inference
(1mark)	(1mark)

(b) Divide the filtrate into four portions.

I. To the first portion, add sodium hydroxide solution drop wise until in excess.

Observation	Inference
(1mark)	(1 mark)

II. Dip a nichrome wire loop into the second portion. Hold the wire in a non-luminous Bunsen burner flame.

Observation	Inference
( $\frac{1}{2}$ mark)	( $\frac{1}{2}$ mark)

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

Observation	Inference

(1mark)	(1mark)
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IV. To the fourth portion, add 2 drops of acidified potassium manganate (VII)

Observation	Inference
(1mark)	(1mark)

(c) (i) Scrap the residue from the filter paper and put it in a test tube. Add about 5cm<sup>3</sup> of dilute nitric (V) acid.

Observation	Inference
(1mark)	(1mark)

(ii) To about 2cm<sup>3</sup> of the resultant solution in C(i), add 2M ammonia solution dropwise until in excess.

Observation	Inference
(1mark)	(1mark)

3. You are provided with an organic compound labeled **solid T**. Carry out the tests indicated below and write your observations and inferences in the spaces provided.

a) Put half of **solid T** on a clean metallic spatula and ignite.

Observations	Inferences

(1 mark)	(1 mark)

b) Put the remaining **solid T** in a boiling tube. Add 10cm<sup>3</sup> of distilled water and shake. Divide the mixture into four portions.

i) Using the first portion, determine the P<sup>H</sup> of solution T

Observations	Inferences
( $\frac{1}{2}$ mark)	( $\frac{1}{2}$ mark)

ii) To the second portion, add sodium hydrogen carbonate solid.

Observations	Inferences
(1 mark)	(1 mark)

iii) To the third portion, add two drops of acidified potassium manganate (VII).

Observations	Inferences
(1 mark)	(1mark)

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