

NAME.....INDEXNO.....ADM NO.....

SCHOOL.....SIGN.....DATE.....



**ACK MASENO WEST JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION**

233/3

CHEMISTRY

(PRACTICAL)

PAPER 3

MARCH – APRIL-2025

TIME: 2¹/₄ HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name, admission number in the space provided.
2. Answer all the questions in the spaces provided
3. All working must be clearly shown where necessary.
4. You are not allowed to start working with the apparatus for the first 15 minutes. This time is to enable you read the question paper and make sure you have all the requirements.
5. Candidates should check the question paper to ascertain that all the 7 pages are printed as indicated and that no questions are missing.

FOR EXAMINERS USE ONLY

QUESTION	MARKS	CANDIDATES SCORE
1	21	
2	13	
3	6	
TOTAL	40	

You are provided with

- 4g of solid A , hydrated ethanedioic acid ($\text{H}_2\text{C}_2\text{O}_4 \cdot \text{XH}_2\text{O}$).
- Solution B , 0.2M sodium hydroxide.
- You are required to determine:
 - i) Solubility of A
 - ii) The value of X in the formula $\text{H}_2\text{C}_2\text{O}_4 \cdot \text{XH}_2\text{O}$

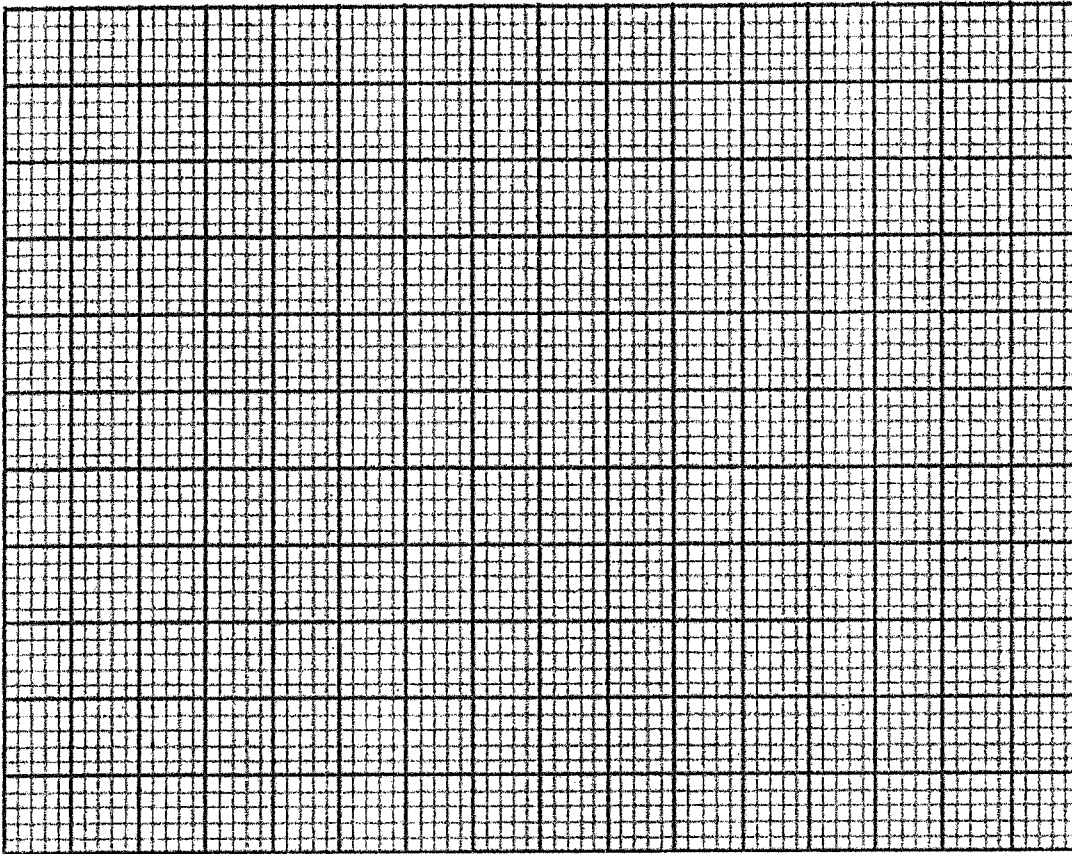
Procedure I

1. Fill the burette with distilled water.
2. Place all the solid A into a boiling tube.
3. Transfer 4cm^3 of distilled water from the burette into the boiling tube containing solid A.
4. Heat the mixture while stirring with the thermometer to a temperature of 80°C .
5. Allow the solution to cool while stirring with the thermometer.
6. Record the temperature at which crystals start to form in the table below.
7. Add a further 2cm^3 of distilled water from the burette to the mixture.
8. Repeat the procedure from step 4 to step 6 above and record the crystallization temperatures.
9. Complete the table 1 below by adding volumes of distilled water as indicated, recording the crystallization temperatures and calculating the solubility of A at different temperatures. (Preserve the contents of the boiling tube for procedure II)

Table 1

Volume of distilled water in the boiling tube (cm^3)	Crystallization temperature ($^\circ\text{C}$)	Solubility of solid A in (g/100g of water)
4		
6		
8		
10		
12		

- a) On the grid provided, plot the graph of solubility of solid A against crystallization temperature. (3mks)
- (5mks)



b) From the graph determine:

i) Solubility of A at 55°C (1mk)

ii) The temperature at which 80g of A dissolves in 100g of water (1mk)

iii) How does solubility of A vary with temperature? (1mk)

Procedure II

1. Transfer the contents of the boiling tube into a clean 250ml volumetric flask . Add distilled water to the mark. Label this resulting solution A.
2. Fill a burette with solution A .
3. Pipette 25cm³ of solution B into a clean 250ml conical flask . Add 3 drops of phenolphthalein indicator .
4. Titrate solution A against B to an accurate end point. Record your results in the table II below.
5. Repeat the experiment two more times and complete the table II below.

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

(4mks)

- i) Calculate the average volume of solution A used (1mk)
- ii) Calculate the number of moles of solution B used (1mk)
- iii) Calculate the number of moles of solution A used (the dibasic acid)(1mk)
- iv) Calculate the concentration of solution A in moles per litre (1mk)
- v) Determine the value of X in the formula H₂C₂O₄. XH₂O (2mks)

2. You are provided with solid L which is a mixture. Carry out the tests below. Record your observations and inferences in the table below.

i. Place all the solid in a boiling tube and add 10cm^3 of distilled water.

ii. Shake and then filter the mixture.

iii. Keep both the filtrate and residue.

a) Divide the filtrate into 4 portions.

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

Observation	Inferences
(1mk)	(1mk)

ii. Into the second portion, dip a clean metallic spatula into the filtrate and ignite over a non-luminous flame.

Observation	Inferences
($\frac{1}{2}$ mk)	($\frac{1}{2}$ mk)

iii. To the third portion, add 3 drops of Lead (II) nitrate solution and warm.

Observation	Inferences
(1mk)	(1mk)

iv. To the fourth portion add 2 – 3 drops to acidified potassium dichromate (VI)

Observation	Inferences
(1mk)	(1mk)

b) i) Transfer the entire residue into a test tube and add nitric (V) acid drop wise and shake until all the solid dissolves . Divide the solution into 3 portions.

Observation	Inferences
(1mk)	(1mk)

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

Observation	Inferences
(1mk)	(1mk)

iii) To the second portion, add aqueous ammonia solution drop wise until in excess.

Observation	Inferences
(1mk)	(1mk)

3. You are provided with an organic compound F. Carry out the test below and record your observations and inferences in the spaces provided.

a). Transfer all solid F into a clean boiling tube and add about 10cm^3 of distilled water and shake thoroughly.

Observation	Inferences
(1mk)	($\frac{1}{2}$ mk)

b) To about 2cm^3 of solution F in a test tube, add 3 drops of acidified potassium manganate (VII) solution and shake thoroughly.

Observation	Inferences
(1mk)	(1mk)

c) To about 2cm^3 of solution F dip a piece of universal indicator paper provided.

Observation	Inferences
($\frac{1}{2}$ mk)	($\frac{1}{2}$ mk)

d) To about 2cm^3 of solution F, add small amount of solid sodium hydrogen carbonate.

Observation	Inferences
(1mk)	($\frac{1}{2}$ mk)

