

Name..... **SCHEME**Index No.ADM.....

SchoolDate.....

233/3
CHEMISTRY
PAPER 3
PRACTICAL

MOKASA M S

JUNE, 2021
Time: 2 ¼ Hours

MOKASA I EXAMINATION

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

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided.
- Sign and write the date of examination in the spaces provided.
- 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 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 required.
- **All working must** be clearly shown where necessary
- Mathematical tables and electronic calculators may be used.
- This paper has 7 printed pages. Check to confirm that it is so.

FOR EXAMINER'S USE ONLY

QUESTION	Max Score	Candidate Score
1	22	
2	10	
3	08	
TOTAL	40	

1(a) You are provided with:

- Solution A, containing 39.2g/l of $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot n\text{H}_2\text{O}$
 - Solution B Containing 3.0g/l of KMnO_4 .
- You are required to determine;
- The concentration of solution A in moles per litre
 - The number of moles of (n) of water of crystallization in $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot n\text{H}_2\text{O}$

Procedure

- Fill the burette with solution A.
- Using a pipette filler, pipette 25.0cm³ of solution B into a conical flask and titrate with solution A until a pink colour just appears.
- Record the volume of solution A used in the table below. Repeat the experiment twice and fill the table.

Table 1

Titration	1	2	3
Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of solution A (cm ³)			

(4mks)

CT - 1
 DP - 1
 AC - 1
 PA - 1
 FA - 1

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a) Calculate the average volume of solution A used

(1mk)

b) Determine;

i) Concentration of solution B in moles per litre,
 (K=39, Mn=55, O=16)

(1mk)

$\frac{3.0}{168} \checkmark \frac{1}{2}$ $0.01786 \text{ M} \checkmark \frac{1}{2}$

ii) Number of moles of solution B used.

(1mk)

$\frac{25}{1000} \times \text{Ans (b) (i)} \checkmark \frac{1}{2}$
 Ans: $\frac{1}{2}$

c) Given that the ionic equation for the reaction is:



Determine the number of moles of solution A used.

(1mk)

$$\text{Ans. } b(i) \times 5 \checkmark \frac{1}{2}$$

$$\text{Correct Ans. (c)} \checkmark \frac{1}{2}$$

Determine the;

i) Concentration of solution A in mole per litre

(1mk)

$$\frac{1000 \times \text{Ans. (c)} \checkmark \frac{1}{2}}{\text{Ans. (a)}}$$

Ans. (a)

$$\text{Correct Ans. (c)} \checkmark \frac{1}{2}$$

ii) Relative formula mass of $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot n\text{H}_2\text{O}$

(1mk)

$$\text{RFM} = \frac{39.2 \checkmark \frac{1}{2}}{\text{Ans. (i)}}$$

$$\text{Ans. (c}_2) \checkmark \frac{1}{2}$$

iii) Number of moles of water of crystallization (n) in $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot n\text{H}_2\text{O}$ (1mk)

$$294 + 18n = \text{Ans. (c}_2) \checkmark \frac{1}{2}$$

$$\text{Correct Ans.} \checkmark \frac{1}{2}$$

b. You are provided with 2.0g of solid **R** in a boiling tube.

You are required to determine the solubility of solid **R** at different temperatures.

Procedure

- (i) Using a burette, add 3.0cm^3 of distilled water into the boiling tube with solid **R**.
- (ii) Gently heat the boiling tube, while stirring the contents carefully with a thermometer until the crystals of **R** dissolve completely.
- (iii) Remove the boiling tube from the flame and allow the contents to cool while stirring with the thermometer. Note the temperature at which crystals **just** appear and record it in Table II below.
- (iv) Add 2.0cm^3 of distilled water from the burette into the boiling tube containing the mixture and repeat steps (ii) and (iii) above.
- (v) Repeat step (iv) three more times.
- (vi) Calculate the solubility of solid **R** in water at the different temperatures and complete table 2.

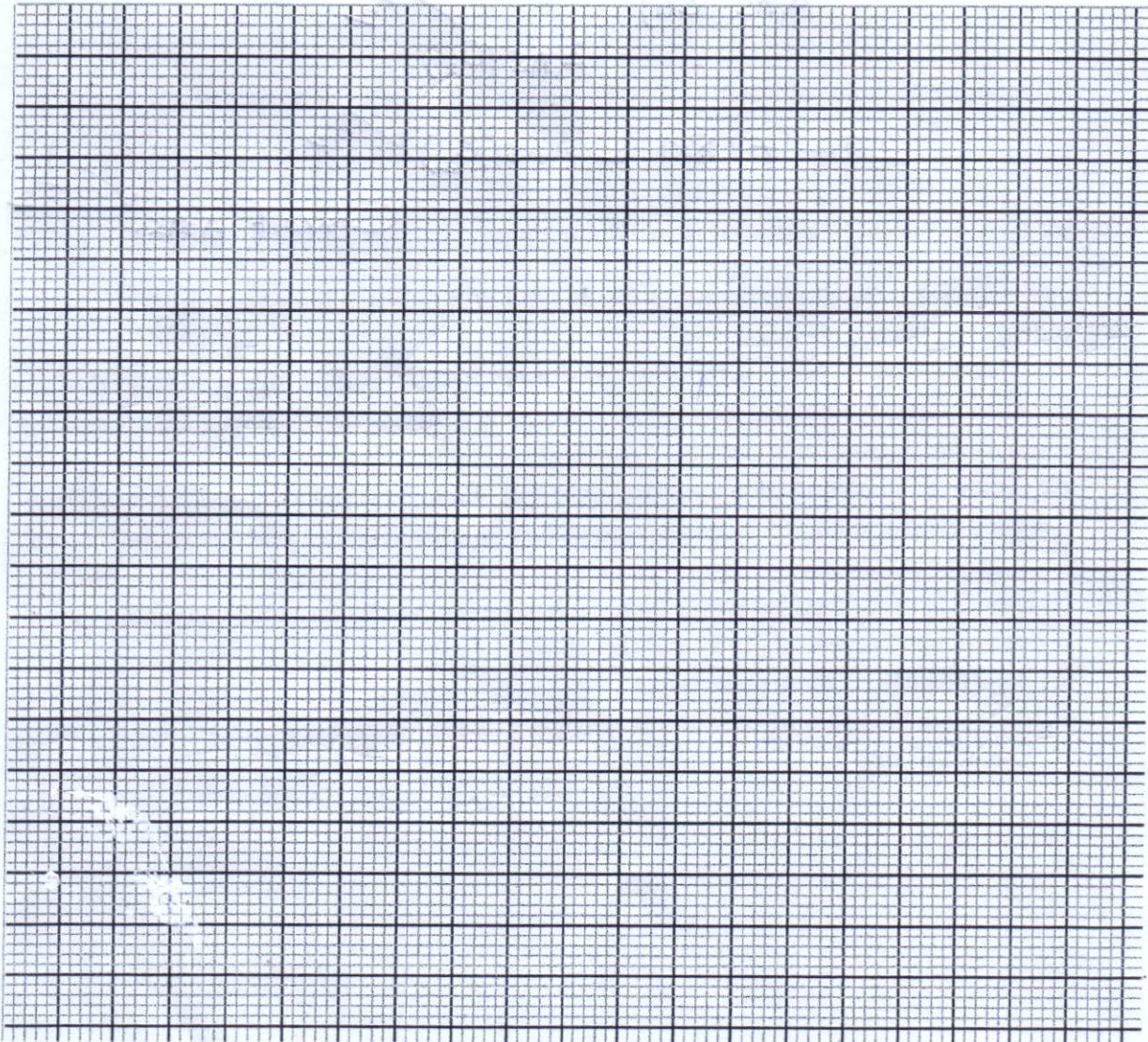
Table 2

CT - 1
 DP - $\frac{1}{2}$
 T - $\frac{1}{2}$
 AC - I
03

Total volume of water added (cm ³)	Temperature at which crystals just appear(°C)	Solubility of solid R in water (g/100g of water)
3		66.7 ✓
5		40.0 ✓
7		28.6 ✓ @ $\frac{1}{2}$ for solubility
9		22.2 ✓
11		18.2 ✓

(5½ marks)

- a) On the grid provided, plot a graph of solubility of solid R (vertical axis) against temperature(horizontal axis) (3 marks)



P - 1
 A - $\frac{1}{2}$
 S - $\frac{1}{2}$
 C - 1
03

