

Name.....Index No.ADM.....

SchoolDate.....

233/3

CHEMISTRY

PAPER 3

PRACTICAL

JULY, 2021

Time: 2 ¼ Hours

MOKASA I

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 25.0cm^3 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)

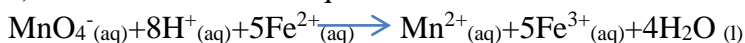
a) Calculate the average volume of solution A used (1mk)

b) Determine;

i) Concentration of solution B in moles per litre, (1mk)
(K=39, Mn=55, O=16)

ii) Number of moles of solution B used. (1mk)

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



Determine the number of moles of solution A used. (1mk)

Determine the;

i) Concentration of solution A in mole per litre (1mk)

ii) Relative formula mass of $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot n\text{H}_2\text{O}$ (1mk)

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)

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

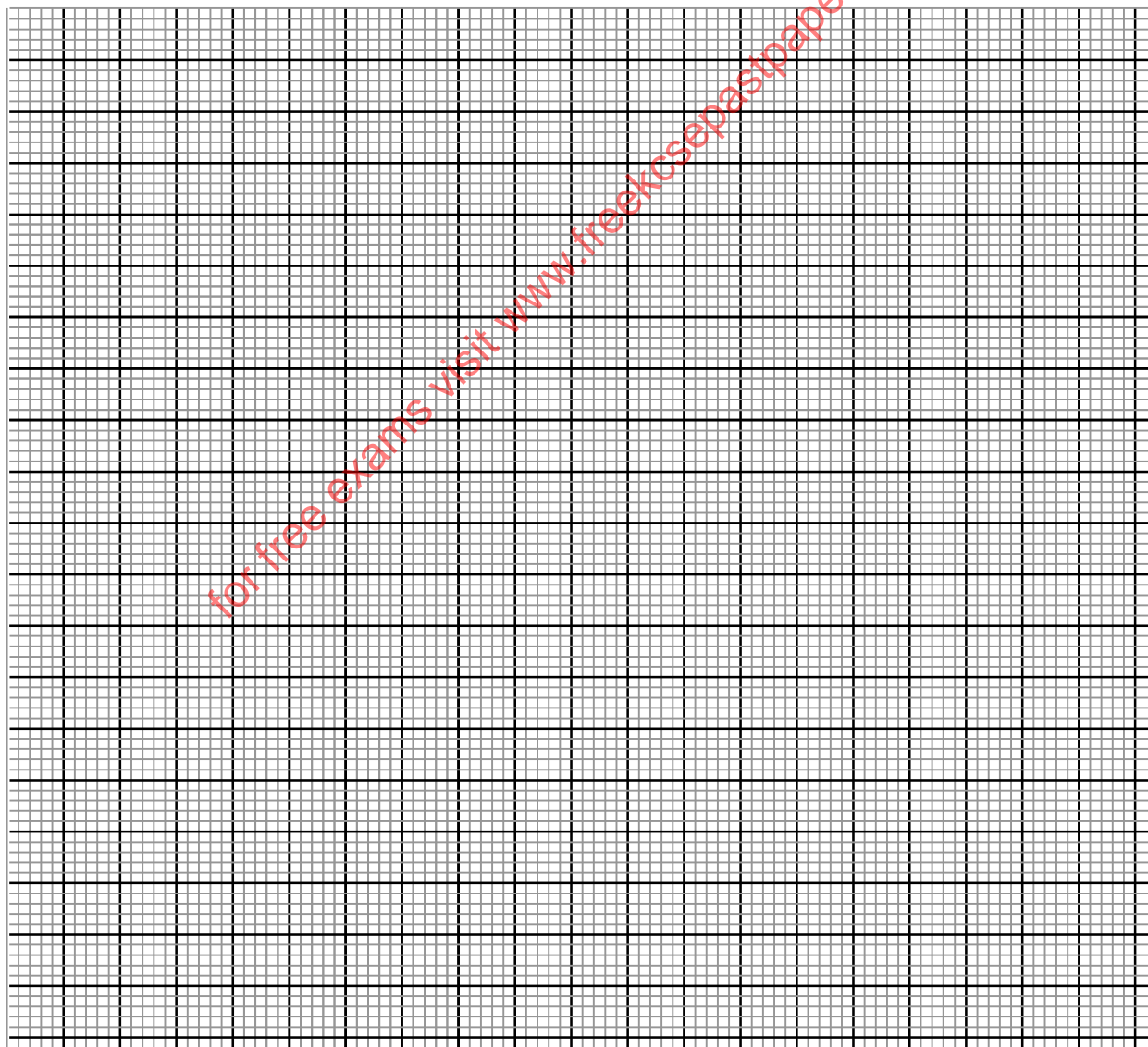
- (i) Using a burette, add 3.0cm^3 of distilled water into the boiling tube with solid **R**.
- (ii) Gently heat the boiling tube, while stirring the contents carefully with a thermometer until the crystals of **R** dissolve completely.
- (iii) Remove the boiling tube from the flame and allow the contents 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

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		
5		
7		
9		
11		

(5½ marks)

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



- b) From your graph, determine
- (i) The temperature at which 35g of solid **R** would dissolve in 100cm³ of water. (1mk)
- (ii) The solubility of solid **R** at 50°C. (1mk)
- (iii) State how solubility varies with temperature. (½mk)

2. You are provided with solid **Q**. Carry out the tests below and record your observations and inferences in the spaces provided.

- (a) Place all of solid **Q** in a clean boiling tube. Add about 10cm³ of distilled water and shake. Divide the resulting solution into 4 equal portions.

Observations	Inference
(1mk)	(1mk)

- (i) To the 1st portion, add drops of sodium sulphate solution.

Observations	Inference
(1mk)	(1mk)

- (ii) To the 2nd portion, add sodium hydroxide solution dropwise until excess.

Observations	Inference
(1mk)	(1mk)

(iii) To a 3rd portion, add ammonia solution dropwise until in excess.

Observations	Inference
(1mk)	(1mk)

(iv) To the fourth portion, add 2-3 drops of acidified barium nitrate solution.

Observations	Inference
(1mk)	(1mk)

3. You are provided with solid **F**. Carry out the tests and record your observations and inferences in the spaces provided.

(i) Place half a spatulaful of solid F in a non luminous flame to ignite.

Observations	Inference
(1mk)	(1mk)

(ii) Place the rest of the solid in a test-tube. Add about 6cm³ of distilled water and shake the mixture well. Divide the solution into 3 portions.

Observations	Inference
(½mk)	(½mk)

(iii) To about 2cm³ of the solution, add a spatulaful of sodium hydrogen carbonate.

Observations	inference
(1mk)	(1mk)

(iv) To about 2cm³, add 2 drops of acidified potassium manganate (vii) solution.

Observations	Inference
(1mk)	(½mk)

(v) To another 2cm³, add 2 drops of bromine water.

Observations	Inference
(1mk)	(½mk)

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