

NAME: .....

INDEX NO:.....

Candidate's Signature: .....

Date:.....

233/3

CHEMISTRY

Paper 3

PRACTICAL

March/April, 2017

Time: 2 ¼ Hours

**MOI GIRLS EVALUATION EXAMINATION**

**Kenya Certificate of Secondary Education**

233/3

CHEMISTRY

Paper 3

PRACTICAL

March/April, 2017

Time: 2 ¼ Hours

**Instructions to candidates**

- Write your name and index number in the spaces provided above.
- Sign and write the date of the examination.
- 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 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.
- Mathematical tables and silent electronic calculators may be used.
- All working must clearly be shown where necessary.

**For examiners use only**

Question	Max score	Candidates score
1		
2		
3		
Total		

1. You are provided with;
- Solution A – Ferrous ammonium sulphate ( $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot \text{XH}_2\text{O}$ ) containing 8.5g in  $250\text{cm}^3$  of solution
  - Solution B 0.02M acidified potassium manganate(VII)

You are required to determine the value of X in  $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot \text{XH}_2\text{O}$

**Procedure I**

Fill the burette with solution B. Pipette  $25.0\text{cm}^3$  of solution A into a clean conical flask and titrate until the solution turns pink. Record your results in table I below. Repeat the procedure and fill table I

a)

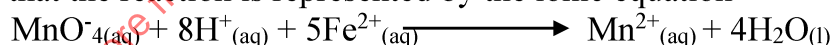
Table I	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution B used ( $\text{cm}^3$ )			

(4 marks)

- b)i) Calculate the average volume of solution B used (1 mark)

- ii) The number of moles of solution B in volume in (i) above (1 mark)

- c) Given that the reaction is represented by the ionic equation



Determine;

- (i) The number of moles of iron (II) salt solution A in  $25.0\text{cm}^3$  of the solution used. (1 mark)

- (ii) The concentration of solution A in moles per litre (1 marks)

- (iii) The concentration of solution A in grams per litre (1 marks)

(iv) The relative formula mass of iron (II) salt

(1 marks)

(v) The value of X in the formula  $\text{FeSO}_4 \cdot (\text{NH}_4)_2 \text{SO}_4 \cdot X\text{H}_2\text{O}$  Fe=56, N=14, S=32, O=16

(1 mark)

2. You are provided with 4.0g of an organic substance solid N.

You are required to determine the solubility of N in distilled water.

#### Procedure I

- (i) Fill the burette with distilled water
- (ii) Place solid N in a boiling tube
- (iii) Transfer  $4.0\text{cm}^3$  of distilled water from the burette into the boiling tube containing solid N.
- (iv) Heat the mixture while stirring with thermometer to a temperature of  $80^\circ\text{C}$ .
- (v) Allow the solution to cool while stirring with a thermometer.
- (vi) Record the temperature at which crystals start to form in table II below.
- (vii) Add a further  $2.0\text{cm}^3$  of distilled water from the burette to the mixture.

Repeat procedure (iv) and (v) above and record the crystallization temperature.

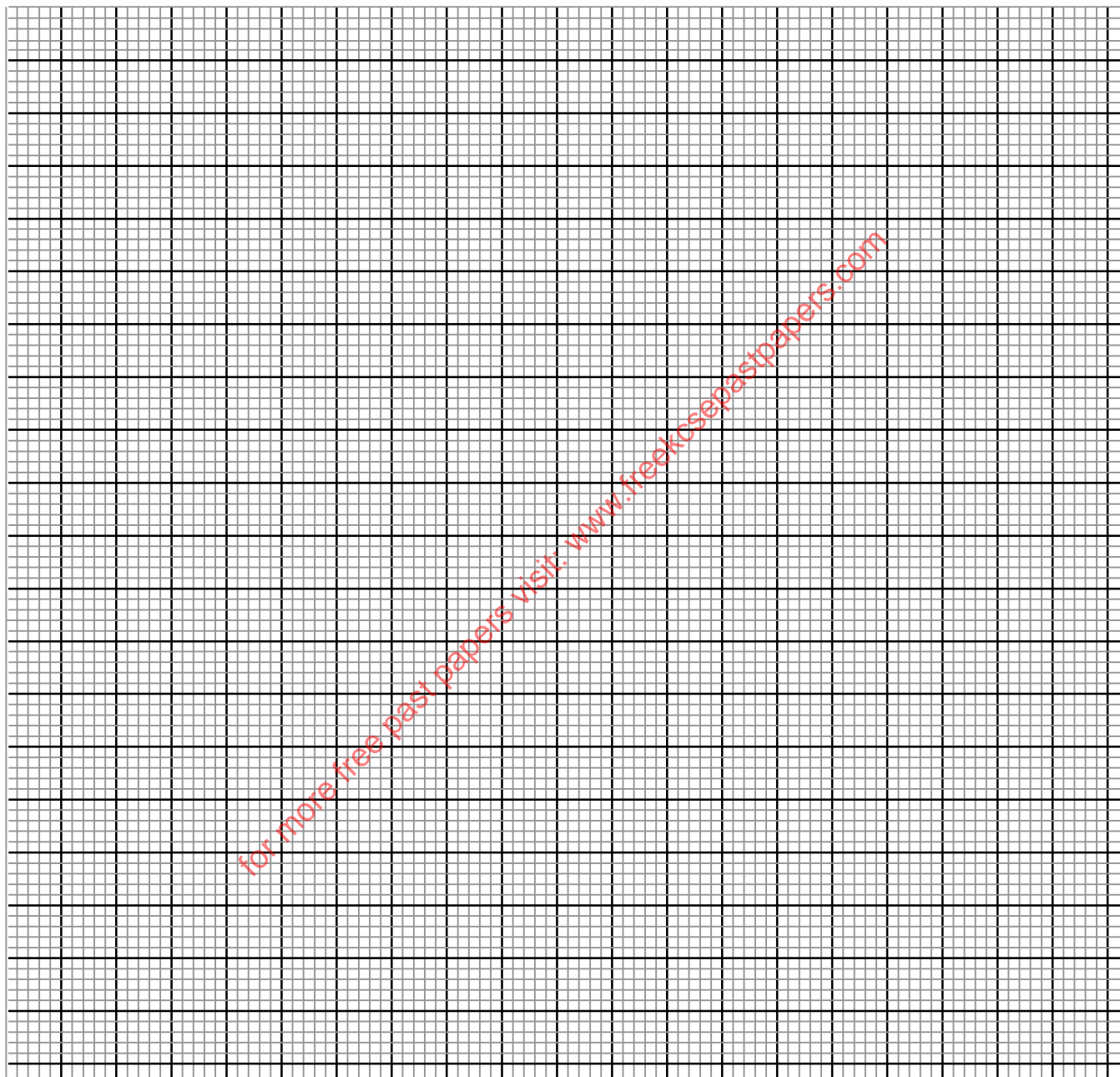
Complete table II below by adding volumes of distilled water as indicated  
(PRESERVE THE CONTENTS)

TABLE II

Volume of distilled water	Crystallization temperature	Solubility of solid N in g/100g water
4		
8		
10		
12		

(5 mks)

- b) On the grid provided, plot a graph of solubility of N (y-axis) against crystallization temperature (3 marks)



- b) From the graph, determine;
- (i) The solubility of N at 50°C (1 mark)
- (ii) The temperature at which 40g of P dissolves in 50g water. (1 mark)

(i) Place 2cm<sup>3</sup> of the preserved solution and add 2 drops of acidified potassium manganate (VII)

(ii) Add a few drops of bromine water

(iii) To 2cm<sup>3</sup> of the preserved solution in a second test tube add a spatula of sodium hydrogen carbonate powder.

(iv) To 2cm<sup>3</sup> of the preserved solution in a third test tube add 2 drops of universal indicator.

5

(1/2 mark)	(1/2 mark)
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3. You are provided with solid Q.  
a)(i) Add about 20cm<sup>3</sup> of distilled water to solid Q and shake.

Observation	Inference
(1 mark)	(1 mark)

Filter the mixture obtained in (a (i) above and retain both the filtrate and the residue. Label the filtrate solution F.

- (ii). to about 2 cm<sup>3</sup> of the filtrate F add ammonia solution a little until in excess

Observation	Inference
(1 mark)	(1 mark)

- (iii) To about 2cm<sup>3</sup> of solution of F add few drops of hydrochloric acid

Observation	Inference
(1 mark)	(1 mark)

b)i) To the residue, add about 6 cm<sup>3</sup> nitric(V) acid.

Observation	Inference
(1 mark)	(1 mark)

(ii) Divide the solution in b(i) above into three test tubes. To the first test tube, add two drops of acidified potassium manganate (VII)

Observation	Inference
(1/2 mark)	(1/2 mark)

(iii) Into the second test tube containing the solution in (bi) above dip a glass rod and burn in non-luminous flame.

Observation	Inference
(1/2 mark)	(1/2 mark)

iii) To the third test tube containing the solution in (bi) above, add about three drops of sodium sulphate solution.

Observation	Inference
(1 mark)	(1 mark)

## Confidential

Requirement for each candidate

1. 200cm<sup>3</sup> of solution B
2. 150cm<sup>3</sup> of solution A
3. Exactly 4.0g of solid N
4. Distilled water in a wash bottle
5. 25cm<sup>3</sup> pipette
6. 50cm<sup>3</sup> burette
7. Thermometer range (0-110°C)
8. Stirring rod (Glass)
9. Three conical flasks
10. 9 test tubes
11. Spatula
12. 10ml measuring cylinder
13. Teat pipette (3)
14. Universal indicator (paper/soln and chart)
15. Source of heat
16. White tile
17. Test tube holder (1)
18. One spatula sodium hydrogen carbonate

Access to

2M NaOH

2M Na<sub>2</sub>SO<sub>4</sub>

Acidified KMnO<sub>4</sub>

Notes

Solution B 0.02M KMnO<sub>4</sub>

Solution A prepared by dissolving 8.5g of FeSO<sub>4</sub> (NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub>.6H<sub>2</sub>O in 50cm<sup>3</sup> of in a volumetric flask

Solid N H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>.2H<sub>2</sub>O (hydrated oxalic acid)

Solid Q Each student be given a mixture of one spatula each of CaCO<sub>3</sub> and (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>