

CANDIDATE'S NAME:.....  
SIGNATURE.....

**P525/3**  
**CHEMISTRY**  
**PAPER 3**  
**(PRACTICAL)**  
**MOCK 2024**  
**AUGUST**  
**TIME: 3Hrs  $\frac{1}{4}$  Min**



## **MEBU EXAMINATIONS CONSULT**

### **UGANDA ADVANCED CERTIFICATE OF EDUCATION MOCK EXAMINATIONS 2024**

**CHEMISTRY**  
**(PRACTICAL)**  
**PAPER 3**

**Time: 3 Hours 15 Minutes**

#### **INSTRUCTIONS TO CANDIDATES**

Answer **ALL** questions.

Record your answers on this question paper in the spaces provided.

Mathematical tables, slide rules and silent-programmable calculators may be used.

Reference books (i.e. text books, books on qualitative analysis, etc. Should not be used.

**Candidates are not allowed to start working with the apparatus for the first 15 minutes.**

This time is to enable candidate to read the question paper and make sure they have all the apparatus and chemicals that they may need.

For Examiner's Use Only			
Q.1	Q.2	Q.3	Total

1. You are provided with the following;  
FA1, which is potassium manganate (VII) solution of unknown concentration.  
FA2, which is a 0.05M solution of Ammonium ferrous sulphate,  $(\text{NH}_4)_2\text{SO}_4\cdot\text{FeSO}_4\cdot 6\text{H}_2\text{O}$ .  
Solid A which is an oxalate with the formula  $\text{X}_2(\text{CO}_3)_2$ .

You are required to standardize FA1 and to use it to determine the relative atomic mass of X.

In acid medium, manganate (VII) ions oxidize iron (II) to iron (III) and ethanedioate (oxalate) ions to carbon dioxide.

### Procedure I

Weigh accurately about **0.9g** of A and dissolve it in about 100cm<sup>3</sup> of distilled water in a 250cm<sup>3</sup> volumetric flask. Make the solution to the mark by adding distilled water. Label this solution as **FA3**.

### Results:

Mass of A + weighing bottle = .....g  
Mass of weighing bottle = .....g  
Mass of A = .....g ( $1\frac{1}{2}$  marks)

### Procedure II

Pipette 25.0 cm<sup>3</sup> (or 20.0cm<sup>3</sup>) into a conical flask and add equal volume of 2M of sulphuric acid. Titrate the mixture with FA1.

Repeat the titration until you obtain consistent results.

Record your results in **table 1**

### Results

Volume of the pipette used = .....cm<sup>3</sup> ( $\frac{1}{2}$  mark)

**Table 1** ( $4\frac{1}{2}$  marks)

Burette readings	1	2	3
Final Burette reading (cm <sup>3</sup> )			
Initial Burette reading (cm <sup>3</sup> )			
Volume of FA2 used (cm <sup>3</sup> )			

Values used to calculate average volume of FA2 used are; ( $\frac{1}{2}$  mark)

**END**

b) To 1cm <sup>3</sup> of R add 2cm <sup>3</sup> of distilled water and shake, Test the mixture with litmus paper.		
c) To 1cm <sup>3</sup> of R add a little sodium carbonate solution.		
d) To 1cm <sup>3</sup> of R add 2-3 drops of neutral iron (III) chloride solution.		
e) To 1cm <sup>3</sup> of R add a little Brady's reagent, warm and dilute with water dropwise.		
f) To 1cm <sup>3</sup> of R add acidified potassium dichromate and heat.		
g) To 2cm <sup>3</sup> of R add a 1cm <sup>3</sup> of ethanoic acid followed by a few drops of concentrated sulphuric acid. Heat the mixture and pour in a beaker of cold water.		
h) To 2cm <sup>3</sup> of R in a test tube add 1cm <sup>3</sup> Lucas' reagent, stopper with a cork and shake vigorously <b>but carefully</b> (to avoid any spill). Then leave to stand.		

Describe the nature of R;

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(iv)	To the fourth portion add a little solid ammonium chloride and shake, followed by disodium hydrogen phosphate and then add aqueous ammonia.		
(v)	To fourth portion add lead (II) acetate solution and heat		
(vi)	To the fifth portion carry out a test of your choice to confirm one of the anions.		
c)	Wash the residue with distilled water and dissolve it in a little dilute nitric acid. Divide the resultant solution into two portions.		
(i)	To the first portion add dilute sodium hydroxide dropwise until in excess. Heat the mixture.		
(ii)	To the second portion add aqueous ammonia dropwise until in excess.		
(iii)	To the third portion add excess potassium iodide solution. Then add sodium thiosulphate solution dropwise (with occasional shaking ) until in excess.		

Cations present in Y are; ..... and .....

Anions present in Y are; ..... and .....

3. You are provided with substance R which is an organic compound. You are required to determine the nature of R  
(20 marks)

Test	Observation	Conclusion
a) Burn a little sample of R on a spatula or crucible.		

Average volume of FA2 used.

(2  $\frac{1}{2}$  marks)

### Procedure III

Pipette 20.0 cm<sup>3</sup> or 25.0cm<sup>3</sup> of FA3 into a conical flask and an equal volume of 2M sulphuric acid. Warm the mixture to about 60°C and titrate the warm solution with FA1

Repeat the titration to obtain consistent results.

Record your results in table 2

Volume of the pipette used = .....cm<sup>3</sup> ( $\frac{1}{2}$  marks)

Table 2

Burette readings	1	2	3
Final burette reading (cm <sup>3</sup> )			
Initial burette reading (cm <sup>3</sup> )			
Volume of FA1 used (cm <sup>3</sup> )			

Values used to calculate average volume of FA1 used. ( $\frac{1}{2}$  marks)

Average volume of FA1.

(2  $\frac{1}{2}$  marks )

### Questions.

(a) Write the overall ionic equation of reaction between manganate(VII) ions and

(i) Iron (II) ions. (1  $\frac{1}{2}$  marks )

(ii) Ethanedioate ions.

(1½ marks)

(b).Determine the:

(i). The number of moles of manganate (VII) ions that reacted with iron (II) ions. (2 marks)

(i) Molar concentration of FA1.

(2 marks)

(b) Calculate the:

(i) The concentration of oxalate ions in FA3 in moles per dm<sup>3</sup>.

(3 marks)

(ii) Molar Mass of A.

(2 marks)

(iii).Relative Atomic Mass of X.

(2 marks)

2. You are provided with substance Y that contains **two** Cations and **two** anions. You are required to carry out the following tests to identify the ions. (30 marks)

Test	Observation	Deduction
a) Heat a spatula end full of Y in a clean, dry test-tube until no further change.		
b) To two spatula ends full of K in a clean test-tube add about 6cm <sup>3</sup> of distilled water, shake vigorously and filter. Keep both the filtrate and residue for further tests.		
Divide the filtrate into six portions		
(i) To the first portion add aqueous sodium hydroxide dropwise until in excess and heat.		
(ii) To the second portion add aqueous ammonia drop wise until in excess.		
(iii) To the third portion add a little ammonium oxalate solution		