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School Exam Number:.....Signature:.....

P525/3

*Candidates should **NOT** write their Centre Name or
Centre Number anywhere on this booklet*

CHEMISTRY
(PRACTICAL)

Paper 3

30 July 2024

3¼ hours

ENTEBBE JOINT EXAMINATION BUREAU

Uganda Advanced Certificate of Education

CHEMISTRY

(PRACTICAL)

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

*Attempt **all** questions.*

Answers to all questions are to be written in the spaces provided in this question paper.

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

You are not allowed to use any reference books such as textbooks, booklets on qualitative analysis, etc.

FOR EXAMINERS' USE ONLY			
Question 1	Question 2	Question 3	TOTAL

1. You are provided with the following:

FA1; which is a solution containing manganate(VII) ions.

FA2: which is a solution 2.2g per litre of ethanedionate ions.

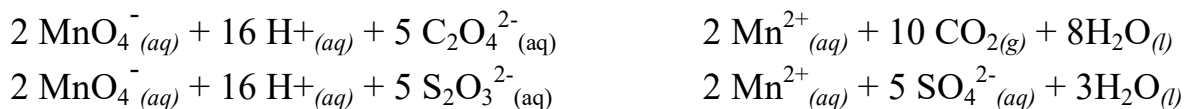
Solid X; which is impure metallic sulphite.

1M sulphuric acid.

You are required to determine the:

- (i) Concentration of manganate(VII) ions in FA1,
- (ii) Percentage purity of the sulphite, X

In acid medium, manganate(VII) ions oxidize ethanedionate and sulphite ions according to the following equations:



Procedure A

- (a) Using a measuring cylinder measure exactly 100cm³ of **FA1** and transfer it into a 250cm³ volumetric flask. Make it up to the mark with distilled water and label the solution **FA3**.
- (b) Pipette 25.0cm³ or (20.0cm³) of **FA2** into a conical flask followed by an equal volume of 1M sulphuric acid. Heat the mixture to about 60°C and filtrate the solution with **FA3** from the burette.
- (c) Repeat the solution to obtain consistent results. Record your results in table I below.

Volume of pipette used.....cm³ ($\frac{1}{2}$ mark)

Table I

Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of FA3 used (cm ³)			

(4½ marks)

State the volume of **FA3** used to calculate the average volume. (1½ marks)

.....

(2½ marks)

.....

.....

(a) Calculate the:

- (04 marks)

[illegible]

- (1½ marks)*

[illegible]

Procedure B

- (a) Weigh accurately about 1.6g of X into a beaker. Add a minimum amount of distilled water and stir to dissolve. Transfer the products into a 250cm³ volumetric flask. Make up to the mark with distilled water and label the resultant solution **FA4**.
- (b) Pipette 25.0cm³ (or 20.0cm³) of **FA4** into a conical flask, followed by an equal volume of 1M sulphuric acid. Titrate with **FA1** from the burette. Repeat the titration to obtain consistent results.
Record your results in table 2 below.

Results:

Mass of weighing bottle + **X**g ($\frac{1}{2}$ mark)

Mass of empty weighing bottleg ($\frac{1}{2}$ mark)

Mass of **X** usedg ($\frac{1}{2}$ mark)

Volume of pipette usedcm³. ($\frac{1}{2}$ mark)

Table II

Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of FA3 used (cm ³)			

(4½ marks)

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

.....
Calculate the average volume of **FA1**. ($2\frac{1}{2}$ marks)

.....
.....

Questions:

- (b) Calculate the concentration of **FA4** in moldm⁻³. (04 marks)

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.....
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.....
.....

- [illegible]

- | TESTS | OBSERVATIONS | DEDUCTIONS |
|---|--------------|------------|
| (a) Heat two spatula endfuls of <i>T</i> in a dry test-tube until there is no further change. | | |

TESTS	OBSERVATIONS	DEDUCTIONS
(b) To two spatula endfuls of <i>T</i> in a test tube, add about 6cm ³ of distilled water and shake thoroughly. Filter and keep the residue for part (c). Divide the filtrate into three parts.		
(i) To the first part of the filtrate, add 2-3 drops of iodine solution.		
(ii) To the second part of the filtrate, add 5 drops of dilute hydrochloric acid and warm.		
(iii) To the third part of the filtrate, add 3 drops of acidified potassium manganate(VII) solution.		
(c) Wash the residue in (b) twice with distilled water. To the washed residue, add dilute nitric acid in small amounts until there is no further change. To the resultant solution, add dilute sodium hydroxide solution dropwise until in excess. Shake and filter. Keep the residue for part (e).		

TESTS	OBSERVATIONS	DEDUCTIONS
(d) To the filtrate, add dilute nitric acid drop wise until the solution is just acidic. Divide the solution into four parts.		
(i) To the first part of the solution, add dilute sodium hydroxide solution dropwise until in excess.		
(ii) To the second part, add aqueous ammonia solution drop wise until in excess.		
(iii) To the third part, add dilute sulphuric acid and warm.		
(iv) Use the fourth part of the solution to carry out a test of your own choice to confirm one of the cations in T . Test		
(e) Wash the residue in (c) and dissolve it in minimum amount of dilute nitric acid. Divide the solution into four parts.		
(i) To the first part, add aqueous ammonia solution drop wise until in excess.		
(ii) To the second , add potassium iodide solution and allow to stand.		

TESTS	OBSERVATIONS	DEDUCTIONS
(iii) To the third part, add concentrated hydrochloric acid drop wise until in excess.		
(iv) Use the fourth part of the solution to carry out a test of your own to confirm the second cation present in T . Test:		

(v) Identify the:

(a) Cations in **T**.....

(b) Anions in **T**.....

3. You are provided with substance A which is an organic compound. You are required to carry out the following tests and identify the nature of A. record your observations and deductions in table 4 below. (18 marks)

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a small amount of A on a spatula end.		
(b) To one spatula endful of A , add about 5cm ³ of distilled water and shake. Test the products with litmus and divide into five parts.		

TESTS	OBSERVATIONS	DEDUCTIONS
(i) To the first part, add neutral iron(III) chloride solution.		
(ii) To the second part, add a spatula endful of magnesium powder.		
(iii) To the third part, add 2-3 drops of acidified potassium dichromate(VI) solution.		
(iv) To the fourth part, add 2,4-dinitrophenyl hydrazine solution.		
(v) To the fifth part, add an equal volume of ethanol followed by 5 drops of concentrated sulphuric acid and heat. Pour the products in a beaker of cold water.		
(c) To half a spatula endful of A in a test tube, add 3 cm ³ of distilled water and shake to dissolve, then add 1 cm ³ of potassium manganate(VII) solution and shake.		

(d) Comment on the nature of **A**.

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