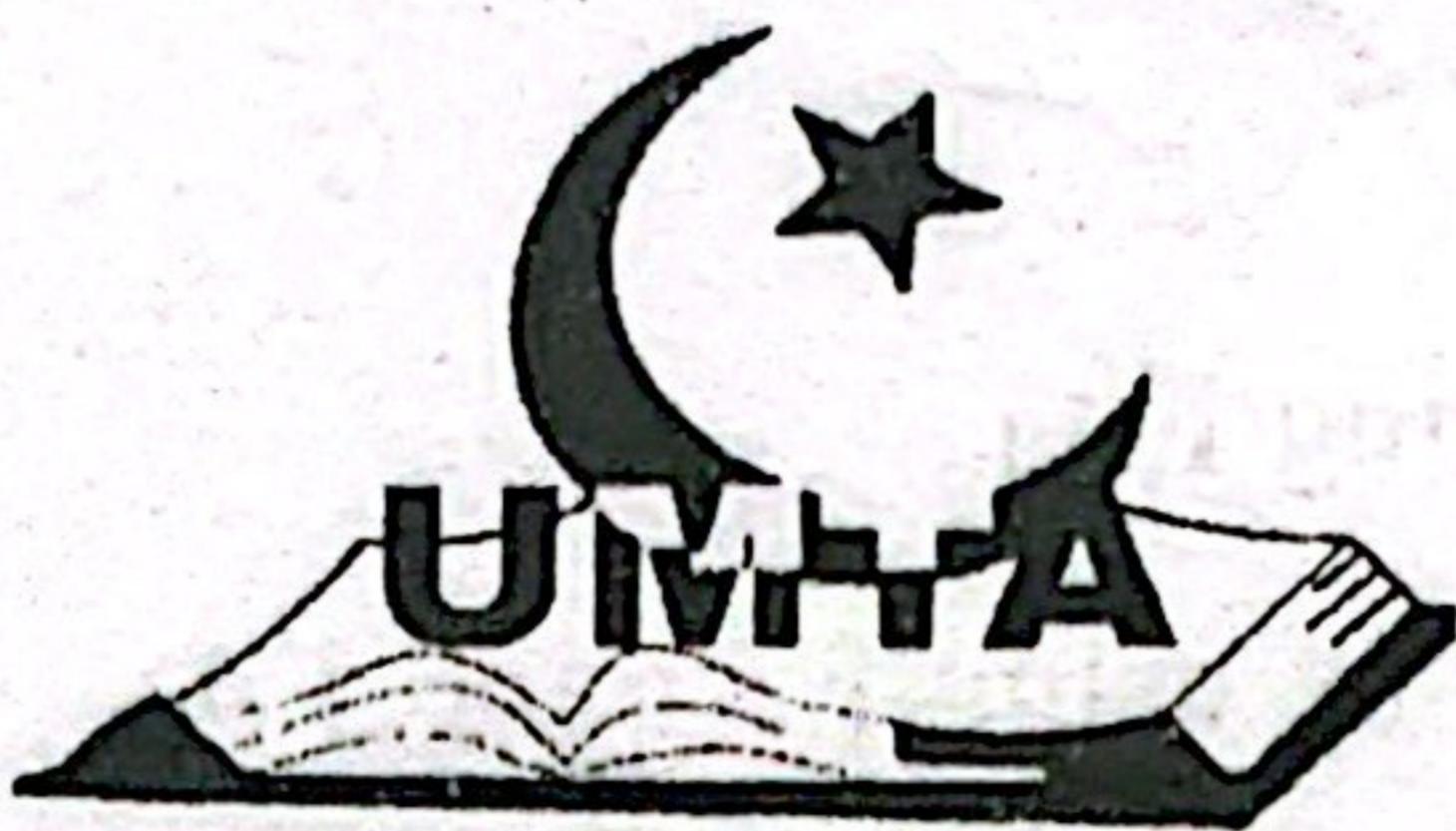


P525/3  
Chemistry  
Paper 3  
July - August 2024  
3 ¼ hours



UGANDA MUSLIM TEACHERS' ASSOCIATION

UMTA JOINT MOCK EXAMINATIONS 2024

Name .....

Centre/Index No. .... Signature .....

UGANDA ADVANCED CERTIFICATE OF EDUCATION

Chemistry

Paper 3

3 hours 15 Minutes

**INSTRUCTIONS TO CANDIDATES:**

- *This paper consists of three compulsory questions.*
- *All questions must be answered in the spaces provided.*
- *Mathematical tables (3 – figure tables) and silent non-programmable scientific electronic calculators may be used.*
- *Candidates are advised to read through the paper and cross check with the apparatus and chemicals provided in the first fifteen minutes.*

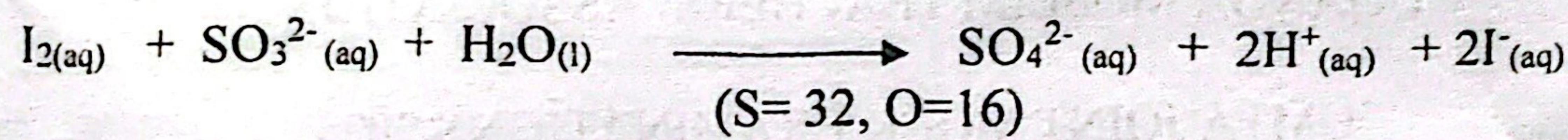
For Examiners' use only			
Question 1	Question 2	Question 3	Total

I. You are provided with

- (a) **FA<sub>1</sub>** which is 0.1M sodium thiosulphate solution
- (b) **FA<sub>2</sub>** which is iodine solution of unknown concentration
- (c) Solid **P** which is a metal sulphite  $M_2SO_3$

You are required to determine:

- (i) The concentration of **FA<sub>2</sub>** using **FA<sub>1</sub>**
- (ii) The relative atomic mass of **M** using **FA<sub>1</sub>** and **FA<sub>2</sub>**



### PROCEDURE 1

Pipette 25cm<sup>3</sup> or 20cm<sup>3</sup> of **FA<sub>2</sub>** into a conical flask and titrate with **FA<sub>1</sub>** until the brown solution just turns yellow. Add five drops of starch and continue the titration until the blue colour just turns colourless. Repeat the titration until you obtain consistent values. Record your values in the table below:

Volume of pipette ..... cm<sup>3</sup>

Titre	1	2	3
Final burette reading /cm <sup>3</sup>			
Initial burette reading / cm <sup>3</sup>			
Volume of use FA <sub>1</sub> /cm <sup>3</sup>			

Volume of **FA<sub>1</sub>** used to calculate average: ..... cm<sup>3</sup> (4½ marks)  
(½ marks)

Average volume of **FA<sub>1</sub>** used..... cm<sup>3</sup> (2½ marks)

(a) Calculate

(i) Moles of  $S_2O_3^{2-}$  in **FA<sub>1</sub>** that reacted with  $I_2$  in **FA<sub>2</sub>** (1½ marks)

(ii) Molarity of FA<sub>2</sub>

(03 marks)

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**PROCEDURE 2**

Weigh accurately 1.6g of P into a beaker and dissolve it in about 100cm<sup>3</sup> of water. Transfer this solution into a 250cm<sup>3</sup> volumetric flask and make it up to the mark with distilled water. Label this solution FA<sub>3</sub>.

Pipette 10cm<sup>3</sup> of FA<sub>3</sub> into a flask followed by 25cm<sup>3</sup> of FA<sub>2</sub>. Then add two spatula endful of sodium hydrogen carbonate. Titrate the excess iodine with FA<sub>1</sub> from the burette using starch indicator. Repeat the titration until consistent values. Record the values in the table below:

Values of FA <sub>2</sub> used	= ..... cm <sup>3</sup>	(½ marks)
Mass of P + beaker	= ..... g	(½ mark)
Mass of beaker only	= ..... g	(½ mark)
Mass of P used	= ..... g	(½ mark)
Volume of FA <sub>3</sub> used	= ..... cm <sup>3</sup>	(½ mark)

Titre	1	2	3
Final burette reading/cm <sup>3</sup>			
Initial burette reading/cm <sup>3</sup>			
Volume of use FA <sub>1</sub> cm <sup>3</sup>			

(4½ marks)

Volume of FA<sub>1</sub> used to calculate average:

..... cm<sup>3</sup> (½ mark)

Average volume of FA<sub>1</sub> used..... cm<sup>3</sup> (2½ marks)

(b) Calculate

(i) Moles of excess iodine that reacted with  $S_2O_3^{2-}$  in  $FA_1$  from the burette. (02 marks)

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(ii) Moles of  $SO_3^{2-}$  in  $250\text{ cm}^3$  of  $FA_3$  (03 marks)

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(iii) Relative atomic mass of M in  $M_2SO_3$

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2. You are provided with substance Y which contains two cations and two anions. You are required to carry out the following tests and identify the ions in Y. Identify any gases that may be evolved. (33 marks)

TEST	OBSERVATION	DEDUCTION
(a) Heat 2 spatula endfuls of Y in a testtube strongly until no further change.		

(b) To one spatula endful of Y in a test tube add concentrated sulphuric acid and heat		
(c) To two spatula endful of Y in a test tube add 3cm <sup>3</sup> of water shake well and then filter. Keep the residue divide the filtrate into four portions		
(i) To the first portion add silver nitrate solution followed by aqueous ammonia		
(ii) To the second portion add lead (II) nitrate solution.		
(iii) To the third portion add bleaching power and 2M sulphuric acid. Then add carbon tetrachloride and allow to stand		
(d) Dissolve the residue in (c) in dilute nitric acid then add sodium hydroxide drop wise until in excess filter and keep both the residue and filtrate.		
(e) To the filtrate in (d) add dilute nitric acid until the solution is just acidic. Divide the acid solution in three portions		
To the first portion add aqueous ammonia drop wise until in excess		

To the <b>second</b> portion add dilute sulphuric acid		
(iii) To the <b>third</b> portion add potassium chromate (VI) solution and then excess sodium hydroxide solution		
(f) Dissolve the residue in (d) in dilute hydrochloric acid divide the solution into three portions		
(i) To the <b>first</b> portion add aqueous ammonia drop wise until in excess		
(ii) To the <b>second</b> portion add dilute sulphuric acid		
(iii) To the <b>third</b> portion add ammonium chloride solid then disodiumhydrogenphosphate solution and then excess aqueous ammonia		

Cations are.....and.....

Anions are .....and.....

3. You are provided with substances S which is an organic compound. You are required to determine the nature of S. Carry out the following tests on S and record your observations and deductions in the table below. (14 marks)

TEST	OBSERVATION	DEDUCTIONS
Burn a small amount of S on a spatula endful or on a crucible		
To a spatula endful of S in a test tube, add 2cm <sup>3</sup> of sodium hydroxide and shake		

(c) To a spatula endful of S in a test tube, add about 3cm <sup>3</sup> of water. Warm the mixture and test the solution with litmus. Divide the hot solution into two parts		
(i) To the <b>first</b> part of the warm solution, add sodium carbonate		
(ii) To the <b>second</b> part of the warm solution, add neutral iron (III) chloride solution		
(iii) To the <b>third</b> part of the warm solution, add acidified potassium dichromate solution and heat		
(iv) To the <b>fourth</b> part of the warm solution, add Brady's reagent		
(v) To the <b>fifth</b> part of the warm solution, add tollens reagent and heat		
(vi) To the <b>sixth</b> part of the warm solution, add Fehling's reagent and heat		

(e) Comment on the nature of S

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END