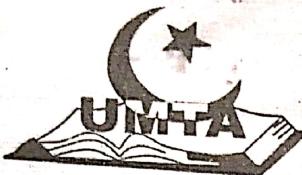


P525/3  
Chemistry  
Paper 3  
July - August 2022  
3 1/4 hours



UGANDA MUSLIM TEACHERS' ASSOCIATION

Name ..... UMTA JOINT MOCK EXAMINATIONS 2022

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			
Q. 1	Q. 2/	Q. 3	Total

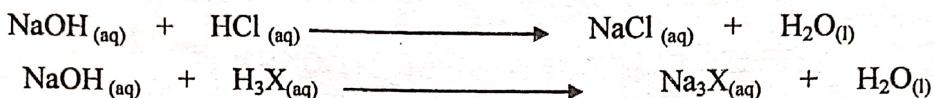
- You are provided with the following;
- FA1** which is 1M hydrochloric acid solution
- FA2** which is approximately 1M sodium hydroxide solution
- FA3** which is a 0.1Msulphuric acid
- Solid T, which is impure tribasic acid  $H_3X$

**You are required to;**

- Standardize solution FA2 using FA1
- Determine the percentage purity of solid T using FA2 and FA3.

### Theory

Sodium hydroxide reacts with the acids according to the equations below:



### Procedure A:

a) Pipette 10cm<sup>3</sup> of FA2 into a clean conical flask followed by 2drops of phenolphthalein indicator and then titrate with FA1 from the burette until the end point. Repeat the titration until you obtain consistent readings. Enter your results in the table I below:

**Table I**

Volume of pipette used = ..... cm<sup>3</sup> (½ marks)

Experiment	I	II	III
Final burette reading /cm <sup>3</sup>			
Initial burette reading /cm <sup>3</sup>			
Volume of FA 1 used /cm <sup>3</sup>			

(4½ marks)

Titre values used to calculate average volume of FA1 (½ marks)

.....

Therefore Average volume of FA1 = ..... cm<sup>3</sup>. (2 ½ marks)

### Questions

Calculate the molar concentration of in FA2.

(4 ½ marks)

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**Procedure B**

- b) Weigh accurately 3.4g of T and add about  $50\text{cm}^3$  of water in a beaker. Stir to dissolve and transfer the contents of the beaker into a  $250\text{cm}^3$  volumetric flask. Make up to the mark with distilled water. Label the resultant solution FA4.
- c) Pipette  $10\text{cm}^3$  of FA4 into a conical flask. Add  $10\text{cm}^3$  of FA2 using a measuring cylinder. Titrate the mixture with solution FA3 from the burette until the end point. Repeat the titration until you obtain consistent readings. Enter your results in table II below.

**Table II**

Mass of empty bottle + T = .....g  
Mass of empty bottle alone = .....g  
Mass of T alone = .....g  
Volume of pipette used = ..... $\text{cm}^3$  (2marks)

Experiment	I	II	III
Final burette reading / $\text{cm}^3$			
Initial burette reading / $\text{cm}^3$			
Volume of FA 1 used / $\text{cm}^3$			

Titre values used to calculate average volume of FA1 used are

.....and .....  $\text{cm}^3$  (½ marks)

Therefore average volume of FA1 used = ..... $\text{cm}^3$

(2½ marks)

**Questions**

- d) Calculate the number of moles of;  
i) sulphuric acid that reacted with the excess sodium hydroxide in FA4.

(1½ marks)

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- ii) Sodium hydroxide in  $10\text{cm}^3$  of FA2 added to FA4 (1½ marks)

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ii) tribasic acid in  $10\text{cm}^3$  of FA4 that reacted with sodium hydroxide (1marks)

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e) Determine the percentage purity of T ( $\text{H}=1 \text{ X}=189$ ) (2½ marks)

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2. You are provided with substance Y which contains three cations and one anion. You are required to carry out the following tests on Y to identify the cations and anion in it. Identify any gases evolved. Record your observations and deductions in the table below.

Tests	Observations	Deductions
a). Heat a spatula end-ful of Y in a dry test tube until there is no further change.		
b) Shake two spatula end-ful of Y in a boiling tube with about $3\text{cm}^3$ of water. Add dilute sodium hydroxide solution to the mixture drop wise until in excess. Warm and filter keep both the filtrate and the residue.		

c) To the filtrate, add dilute nitric acid drop wise until the solution is just acidic. Divide the acidic solution into six parts.		
i) To the first part of the acidic solution, add dilute sodium hydroxide solution drop wise until in excess.		
ii) To the second part of the acidic solution, add dilute ammonia solution drop-wise until in excess.		
iii) To the third part of the acidic solution, add 2-3 drops of potassium iodide solution.		
iv) To the fourth part of the acidic solution, add 2-3 drops of litmus solution followed by ammonia solution drop-wise until in excess.		
v) To the fifth part of the acidic solution, add 2-3 drops of lead (II) nitrate solution and heat.		
vi) Use the sixth part to carry out a test of your own choice to confirm the anion in Y ..... .....		
d) Wash the residue with water and dissolve it in dilute hydrochloric acid and divide the solution into three parts.		

i) To the first part of the acidic solution, add dilute sodium hydroxide solution drop-wise until in excess.		
ii) To the second part of the acidic solution, add dilute ammonia solution drop wise until in excess.		
iii) To the third part of the acidic solution add 3-4 drops of potassium thiocyanate solution.		

The cations in Y

are ..... and .....

The anion in Y is .....

3. You are provided with an organic compound Q. You are required to identify the nature of compound Q. Carry out the following tests on the compound and record your observations and deductions in the table below.

Tests	Observations	Deductions
• Burn a spatula end-ful of Q on a porcelain dish or at the end of a spatula.		
• Shake 1cm <sup>3</sup> of Q with about 2cm <sup>3</sup> of water and test with litmus.		
• To 0.5cm <sup>3</sup> of Q add 2-3 drops of sodium carbonate solution.		
• To 0.5cm <sup>3</sup> of Q, add 2-3 drops of acidified potassium dichromate solution and heat.		

<ul style="list-style-type: none"> <li>To <math>0.5\text{cm}^3</math> of Q, add 2-3 drops of Brady's reagent.</li> </ul>		
<ul style="list-style-type: none"> <li>To about <math>1\text{cm}^3</math> of Q, add acidified potassium dichromate solution and heat. Then add ethanol followed by 4-5 drops of concentrated sulphuric acid. Pour the mixture into a small beaker of cold water</li> </ul>		
<ul style="list-style-type: none"> <li>To about <math>0.5\text{cm}^3</math> of Q, add about <math>4\text{cm}^3</math> of iodine solution followed by sodium hydroxide solution drop-wise until the brown color of iodine is just discharged. Warm the mixture and allow to stand.</li> </ul>		
<ul style="list-style-type: none"> <li>To about <math>1\text{cm}^3</math> of Q, add about 5 drops of tollen reagent and heat gently</li> </ul>		

Comment on the nature of Q

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\*\*\*END\*\*\*

- FA2 is 1M sodium hydroxide solution @ 50ml.
- FA3 is 0.1M sulphuric acid. @ 30ml.
- Solid Y is a mixture of  $[Al_2(SO_4)_3]$  and  $Fe_2(SO_4)_3$  and  $(NH_4)_2(SO_4)_3$  in ratio 3:2:1 @ 3g .
- Solid T is anhydrous citric acid @ 4g.
- Q is Ethanol @ 6ml.
- 8 test tubes in a test tube rack.
- A weighing scale.
- Source of heat.
- Reagents for qualitative analysis.

P525/3

CHEMISTRY

July/August 2022

ADVANCE INSTRUCTIONS



UGANDA MUSLIM TEACHERS' ASSOCIATION

UMTA JOINT MOCK EXAMINATIONS – 2022

UGANDA ADVANCED CERTIFICATE OF EDUCATION

Chemistry 3

CONFIDENTIAL

INSTRUCTIONS FOR PREPARING APPARATUS AND CHEMICALS.

In addition to the fittings and substances ordinarily contained in a chemistry laboratory, each candidate will require.

- 1 burette (50ml).
- 1 pipette (10ml).
- 2 conical flasks.
- 1 volumetric flask.
- A measuring cylinder.
- Phenolphthalein indicator.
- FA1 is 1M hydrochloric acid solution @ 50ml.