

P525/3

CHEMISTRY

Paper 3

Jul/Aug 2019

3¼ Hours



MUKONO EXAMINATION COUNCIL
Uganda Advanced Certificate of Education
CHEMISTRY PRACTICAL
Paper 3
3 Hours 15 Minutes

INSTRUCTIONS TO CANDIDATES

- The paper consists of **three (3)** compulsory questions.
- Answer **all** questions in the spaces provided.
- No additional answer sheets will be provided.

1. You are provided with the following;

FA1, which is an aqueous solution of a dibasic acid, H_2X

FA2, which is a **0.1M** sodium hydroxide solution.

Solid Q, which is a metal carbonate M_2CO_3 (RFM of Q = 74)

You are required to determine the molar concentration of **FA1** and the percentage of the impurity in Q.

Procedure A

- a) Using a 10cm^3 measuring cylinder transfer exactly **8.5cm^3** of **FA1** into a 250cm^3 volumetric flask and make up to the mark distilled water. Shake the flask to mix the contents thoroughly. Label the solution **FA3**.
- b) Pipette **20.0 or 25.0cm^3** of **FA2** into a clean conical flask and add 2-3 drops of phenolphthalein indicator. Titrate the contents with solution FA3 from the burette. Repeat the titration 2-3 times to obtain consistent results. Enter your results in the table below.

Results

Table 1

Volume of pipette used cm^3

Experiment	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of FA3 used (cm^3)			

Titre values used for calculating the average volume of **FA3** used;

..... and

Average volume of **FA3** used

.....

Questions

c) Calculate the concentration in mol dm^{-3} of H_2X in

(i) **FA3**

.....

.....

.....

.....

.....

.....

.....

.....

(ii) **FA1**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Procedure B

- a) Weigh accurately about **1.2g** of **Q** and dissolve it in **15cm³** of **FA1** in a beaker. Transfer the solution with washings into **250cm³** volumetric flask and make up to the mark with distilled water. Label the resultant solution **FA4**.
- b) Pipette **20.0cm³** or **25.0cm³** of **FA2** into a clean conical flask and add 2-3 drops of phenolphthalein indicator and then titrate with solution **FA4** from the burette. Repeat the titration 2-3 times to obtain consistent results. Enter your results in the table II below.

Results

Table II

Mass of weighing container + **Q** =g

Mass of weighing container =g

Mass of **Q** used =g

Volume of pipette usedcm³

Experiment	1	2	3
Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of FA4 used (cm ³)			

Titre values used for calculating the average volume of **FA4** used.

..... and

Average volume of **FA4** used;

.....

.....

Questions

c) Calculate the number of moles of acid that;

(i) did not react with the carbonate.

.....

.....

.....

.....

.....

.....

.....

.....

.....
.....
(ii) reacted with the carbonate.
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

d) Determine the;

(i) mass of the carbonate that reacted with the acid.

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

(ii) Percentage of the impurity in solid Q.

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

2. You are provided with substance **Y** which contains two cations and two anions. You are required to identify the cations and anions in **Y**. Carry out the following test on **Y** and record your observations and deductions in the table below. Identify any gas(es) evolved.

Tests	Observations	Deductions
(a). Heat one spatula endful of Y strongly in a dry test tube until there is no further change		
(b). To two spatula endfuls of Y , add concentrated nitric acid drop wise until the solid just dissolves. To the resultant solution add sodium hydroxide solution drop wise until in excess and filter. Keep both the filtrate and residue		
(c). To the filtrate, add dilute nitric acid drop wise until the solution is just acidic. Divide the resultant solution into seven portions		

<p>(i) To the first portion of the acidic solution, add sodium hydroxide solution drop wise until in excess</p>		
<p>(ii) To the second portion of the acidic solution, add aqueous ammonia drop wise until in excess</p>		
<p>(iii) To the third portion of the acidic solution, add 2-3 drops of potassium iodide solution</p>		
<p>(iv) Use the fourth portion of the acidic solution to carry out a test of your choice to confirm one of the cations in Y.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>		

(v) To the fifth portion of the acidic solution, add 3-4 drops of lead (ii) nitrate solution		
(vi) To the sixth portion of the acidic solution, add 3-4 drops of barium nitrate solution		
(vi) To the seventh portion of the acidic solution, add 3-4 drops of silver nitrate solution followed by excess ammonia solution		
(d) Wash the residue and dissolve it in 4cm ³ of dilute nitric acid. Divide the resulting solution into three portions		

(i) To the first portion add sodium hydroxide solution drop wise until in excess		
(ii) To the second portion add aqueous ammonia drop wise until in excess		
(iv) Use the third portion of the filtrate to carry out a test of your choice to confirm one of the cations in Y . Test: 		

(e)(i). Cations in **Y**:and.....

(ii). Anions in **Y**:and

3. You are provided with organic substance **G**. You are required to identify the nature of **G**. Carry out the following test on **G** and record your observations and deductions in the table below.

Tests	Observations	Deductions
(a) Burn a spatula endful of G on a porcelain dish or at the end of a spatula		
(b) To 2 cm ³ of G add 3 cm ³ of water. Shake vigorously and test with litmus. Divide the mixture into four portions		
(i) To the first portion of the solution, add 3-4 drops of sodium carbonate solution		
(ii) To the second portion of the solution, add 2-3 drops of iron(III) chloride solution		

(iii) To the third portion of the solution, add 3-4 drops of Brady's reagent		
(iv) To the fourth portion of the solution, add 2-3 drops of potassium dichromate(vi) solution and warm		
(c) To 1cm ³ of G add 3cm ³ of iodine solution followed by sodium hydroxide solution drop wise until the solution is pale yellow. Warm the mixture and allow to stand.		

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

.....

End -