Name……

Signature ……..……

P525/3

CHEMISTRY

(Practical)

Paper 3

Sep/Oct. 2023

3 ¼ HOURS

WWEK PRACTICALS

Uganda Advanced Certificate of Education

S6 CHEMISTRY

(PRACTICAL)

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** questions. Use **blue** or **black** ink. Any work done in pencil will **not** be marked **except** drawings.

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

Mathematical tables and silent non-programmable scientific calculators may be used.

*Reference books (i.e. text books, booklets 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 candidates 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 a 0.1M hydrochloric acid

FA2, which is approximately a 0.1 M sodium hydroxide solution

FA3, which is 2M Hydrochloric acid

Solid **W**, which is impure metal carbonate.

You are required to standardize **FA2** and use it to determine the percentage of the impurity in **W**.

PROCEDURE I:

(a) Pipette 20.0cm^3 or 25.0cm^3 of **FA2** into a conical flask. Titrate with **FA1** using phenolphthalein as the indicator. Repeat the titration until you obtain consistent results. Record your results in table below.

Table:

Volume of pipette used ……...cm^3

Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **FA2** used (cm^3)			

Values used for calculating average of **FA1**

……..and ……cm^3

Average volume of **FA1**

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Question:

Calculate the concentration in moles per litre of solution **FA2**.

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(b) Weigh 1.5g of **W** and dissolve it in 20.0cm^3 of **FA3** in a beaker. Add 80cm^3 of distilled water and label this solution **FA4**.

Pipette 20.0cm^3 or 25.0cm^3 of **FA2** into a conical flask and titrate it with **FA4** using phenolphthalein as the indicator. Record you results in the table below.

Results:

Mass of container + **W** = ……g

Mass of empty container = ……g

Mass of **W** = ……g

Table:

Volume of pipette used ……cm^3

Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **FA2** used (cm^3)			

Values used to calculate the average of **FA4**.

…….. and ……..cm^3

Average volume of **FA4** used

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Questions:

(a) Calculate the:

(i) Number of moles of hydrochloric acid that was in 100cm^3 of **FA4**.

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(ii) Number of moles of the metal carbonate that reacted. (the metal carbonate reacts with hydrochloric acid in the ratio 1:2)

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(b) Determine the percentage of the impurity in **W**. (Relative formula mass of the metal carbonate is 84)

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2. You are provided with a substance **P** containing two cations and two anions. You are required to carry out tests on substance **P** to identify the cations and anions in it. Identify any gas(es) evolved. Record your observations and deductions in Table 3 below. (30 marks)

Table 3

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Shake **two** spatula endfuls of **P** with $5cm^3$ of water. Filter, keep both the **filtrate** and **residue**. Divide the filtrate into **four** parts.		
(i) To the **first** part of the filtrate, add 2-3 drops of dilute sulphuric acid.		
(ii) To the **second** part of the filtrate, add 2-3 drops of lead (II) nitrate solution followed by sodium hydroxide solution dropwise until in excess.		
(iii) To the **third** part of the filtrate, add 2-3 drops barium nitrate solution followed by dilute nitric acid.		

(iv) Use the **fourth** part of the filtrate to carryout a test of your choice to confirm the anion in **P**. **TEST:**		
(b) Wash the **residue** from part **(a)** with water thrice. Dissolve it in dilute hydrochloric acid. Add sodium hydroxide solution dropwise until in excess. Filter, keep both the **filtrate** and **residue**.		
(c) To the filtrate from part (**b**), add dilute hydrochloric acid until the solution is just acidic. Divide the resultant solution into **four** parts.		
(i) To the **first** part of acidic solution, add sodium hydroxide solution dropwise until in excess.		
(ii) To the **second** part of acidic solution, add 2-3 drops of potassium iodide solution.		

(iii) To the **third** part of acidic solution, add ammonia solution dropwise until in excess		
(iv) Use the **fourth** part of acidic solution to carryout your own test to confirm the first cation in **P**. **TEST:**		
(d)Wash the **residue** from part (**b**) twice with sodium hydroxide solution. Dissolve it in dilute nitric acid. Divide the resultant solution into **four** parts.		
(i) To the **first** part of the solution, add sodium hydroxide solution dropwise until in excess.		
(ii) To the **second** part of the solution, add ammonia solution dropwise until in excess.		
(iii) To the **third** part of the solution, add one spatula endful of zinc dust and leave to stand.		

(iv) Use the **fourth** part of the solution to carryout a test of your choice to confirm the second cation in **P**. **TEST:**		

(e i) Cations in **P**
are…….and……

(ii) Anions in **P** are……...and……

3. You are provided with an organic compound **Z**. You are required to carry out tests on **Z** to identify its nature. Identify any gas(es) evolved. Record your observations and deductions in **Table 4** below. (20 marks)

Table 4

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn **Z** on a spatula end or porcelain dish.		
(b) Shake **two** spatula endfuls of **Z** with about $10cm^3$ of water. Test the resultants solution with litmus paper. Divide the resultant solution into **six** parts.		

(i)	To the **first** part of the solution, add 2-3 drops of sodium carbonate solution.		
(ii)	To the **second** part of the solution, add 2-3 drops of Iron (III) chloride solution.		
(iii)	To the **third** part of the solution, add 2-3 drops of Brady's reagent.		
(iv)	To the **fourth** part of the solution, add 2-3 drops of acidified potassium manganate (VII) solution and heat.		
(v)	To the **fifth** part of the solution add Fehling's solution and heat.		
(vi)	To the **sixth** part of the solution, add 2-3 drops of Tollen's reagent and heat.		

(vii) To the **seventh** part of the solution, add 2-3 drops of Iodine solution followed by sodium hydroxide solution until the brown colour of Iodine is discharged. Warm the mixture and allow to cool.		

Comment on the nature of **Z**.

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END

CONFIDENTIAL

FA1- 0.1M HCI

FA2- 0.1M NaOH

FA3- 2M HCI

Solid **W**- $MgCO_3$

P- Potassium chromate, Zinc carbonate and Copper (II) carbonate in ratio 1:3:2

Z- Glucose