**Candidate's Name:** .....

**School:**.....

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**Sign:** .....

| Centre No. | | | | | Personal No. | | |
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**545/3**
**CHEMISTRY**
**PRACTICAL**
**Paper 3**
**JULY/AUG. 2023**
2 hours

# HOIMA DIOCESE EXAMINATIONS BOARD

## UCE Mock Examination, 2023

CHEMISTRY

**Paper 3**

2 hours

**INSTRUCTIONS TO CANDIDATES**

*Answer both questions. Answers are to be written in the spaces provided in this booklet.*

*You are not allowed to use reference books (i.e. text books, booklets on qualitative analysis etc.)*

***All working must be clearly shown.***

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

| FOR EXAMINERS' USE ONLY | | | |
|---|---|---|---|
| Q. 1 | | | |
| Q. 2 | | | |
| TOTAL | | | |

**1.** You are provided with;

**BA1**, which is a **0.2** M Hydrochloric acid.
**BA2**, which is a solution made by dissolving **5.0** g of a mixture of sodium salts of carbonate and nitrate (anhydrous sodium carbonate and sodium nitrate) to make **250** $cm^3$ of solution.

You are required to determine the
(i) mass of anhydrous sodium carbonate in the mixture.
(ii) percentage of sodium nitrate in the mixture.

**Procedure**
(a) Pipette 25.0 $cm^3$ (or 20.0 $cm^3$) of **BA2** into a clean conical flask.
(b) Add 2-3 drops of methyl orange indicator and titrate the solution with **BA1** from the burette up to the endpoint.
(c) Record your results in **Table 1** below.
(d) Repeat the procedure until you obtain consistent results.

**Table 1**
Volume of pipette used .....$cm^3$ *(0½ mark)*

| **Titration number** | **1** | **2** | **3** |
|---|---|---|---|
| Final burette reading ($cm^3$) | | | |
| Initial burette reading ($cm^3$) | | | |
| Volume of **BA1** used ($cm^3$) | | | |

*(07½ marks)*

(a) (i) State the volumes of **BA1** used to calculate the average volume. *(0½ mark)*

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(ii) Calculate the average volume of **BA1** used. *(02½ marks)*

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(b) Write the equation of reaction that took place. *(01½ marks)*

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(c) Calculate the

(i) number of moles of **BA1** that reacted. *(03 marks)*

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(ii) number of moles of **BA2** in 250 $cm^3$ of the solution. *(05 marks)*

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(d) Determine the

(i) mass of sodium carbonate in the mixture. *(02½ marks)*

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(ii) percentage of sodium nitrate in the mixture. *(02 marks)*

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2. You are provided with substance ***P***, which contains **two** cations and **one** anion. Carry out the following tests in **Table 2** below to identify the cations and anion in ***P***.
Identify any gas(es) that may be evolved.
Record your observations and deductions in the table. *(25 marks)*

**Table 2**

| TESTS | OBSERVATIONS | DEDUCTIONS |
|---|---|---|
| (a) Comment on the nature of ***P***. | | |
| (b) Add about 6 $cm^3$ of distilled water to a spatula end-ful of ***P*** in a boiling tube and boil. Filter while still hot and use the filtrate for part **(c)** below. | | |

| | | |
|---|---|---|
| (c) To the filtrate from (b) above, add dilute ammonia solution dropwise until in excess and filter.<br><br>Keep both the filtrate and the residue. | | |
| (d) Acidify the filtrate with dilute nitric acid and divide the acidified filtrate into **four** parts, test as follows:<br><br>(i) To the **first** part, add dilute sodium hydroxide solution dropwise until in excess. | | |
| (ii) To the **second** part, add dilute ammonia solution dropwise until in excess. | | |
| (iii) To the **third** part, add 3 - 4 drops of Lead (II) nitrate solution. | | |

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|---|---|---|
| (iv) To the **fourth** part, add 2-3 drops of silver nitrate solution. | | |
| (e) Wash the residue (c) and dissolve it in dilute nitric acid. Divide the resultant solution into **three** parts:<br>(i) To the **first** part, add dilute sodium hydroxide solution dropwise until in excess. | | |
| (ii) To the **second** part, add dilute ammonia solution dropwise until in excess. | | |
| (iii) To the **third** part, carry out a test of your own choice to confirm one of the cations present in **P**.<br><br>**Test** | | |

(f) The:

(i) cations in ***P*** are ..... and .....

(ii) anion in ***P*** is .....

**END**