NAME .....

RANDOM/PERSONAL No. ...../..... SIGNATURE .....

545/3
CHEMISTRY PRACTICAL
Paper 3
Tuesday 1st August 2023 (Morning)
2 hours

ACHOLI SECONDARY SCHOOLS EXAMINATIONS COMMITTEE

Uganda Certificate of Education

Joint Mock Examinations, 2023

CHEMISTRY PRACTICAL

Paper 3

2 hours

INSTRUCTIONS TO CANDIDATES:

- ✓ Answer **both** questions. Answers are to be written in the spaces provided in this question paper only.
- ✓ All your work must be in blue or black ink. Any work done in pencil except drawings, will NOT be marked.
- ✓ You are NOT allowed to use any reference books (i.e. text books, booklets on qualitative analysis etc.).
- ✓ All working must be clearly shown.
- ✓ Mathematical tables and silent non-programmable scientific calculators may be used.

For Examiner's Use Only		
Questions	Marks	
1		
2		
Total		

Question 1:

You are provided with the following:

- **BA1** which is a solution made by dissolving 3.45g of a hydrated salt, R..nH_2O, in 250 cm^3 of water.
- **BA2** which is a 0.1M hydrochloric acid.

You are required to determine the value of n in the salt.

Procedure:

(i) Pipette 25.0 cm^3 (or 20.0 cm^3) of BA1 into a conical flask. Add 2 – 3 drops of methyl orange indicator and titrate with BA2 from the burette.

(ii) Repeat the titration until you obtain consistent results.

(iii) Record your results in the table below.

Table of Results:

Volume of the pipette used: ..... cm^3 (½ mark)

Experiment Number / Titre Readings	**1**	**2**	**3**
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **BA2** used (cm^3)			

(7½ marks)

Values used to calculate average volume of **BA2** used are: .....and.....cm^3 (01 mark)

Average volume of **BA2** used: ..... cm^3 (2½ marks)

Questions:

(a) Calculate the:-

(i) number of moles of hydrochloric acid that reacted. (2½ marks)

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(ii) number of moles of $R.nH_2O$ that reacted (1 mole of $R.nH_2O$ reacts with 2 moles of hydrochloric acid) (02 marks)

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(iii) number of moles of $R.nH_2O$ in 250 cm^3 of BA1. (03 marks)

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(b) Determine the value of n in $R.nH_2O$. [H = 1; O = 16; R = 106] (5½ marks)

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Question 2:

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

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Heat one spatula end-full of K strongly in a dry test tube.		
(b) Dissolve two spatula end-full of K in about 5 cm^3 of water and to the resultant solution, add dilute sodium hydroxide solution drop-wise until in excess and filter. Keep both the filtrate and the residue.		
(c) To the filtrate, add dilute nitric acid until the solution is just acidic. Divide the acidified solution into five portions. (i) To the **first** portion of the acidified solution, add dilute sodium hydroxide solution drop-wise until in excess.		
(ii) To the **second** portion of the acidified solution, add aqueous ammonia drop-wise until in excess.		
(iii) To the **third** portion of the acidified solution, add 2 – 3 drops of potassium iodide solution.		

TESTS	OBSERVATIONS	DEDUCTIONS
(iv) To the **fourth** portion of the acidified solution, add lead (II) nitrate solution and warm.		
(v) Use the **fifth** portion of the acidified solution to carry out a test of your own to confirm the anion in K. Test:		
(d) Dissolve the residue in minimum amount of dilute sulphuric acid and divide the resultant solution into three parts. (i) To the **first** part of the solution, add sodium hydroxide solution drop-wise until in excess.		
(ii) To the **second** of the solution, add aqueous ammonia drop-wise until in excess		
(iii) To the third part of the solution, add zinc granules and leave to stand for 5 minutes.		

(d) (i) The cations in **K** are..... and.....

(ii) The anion in **K** is.....

END

INSTRUCTIONS FOR PREPARING APPARATUS AND CHEMICALS:

The Head-teacher must ensure that the teacher responsible for preparing the apparatus and chemicals, hands in his/her trial results properly sealed in a separate envelop and firmly fastened/attached to the candidates' scripts envelope(s).

1. The description of the reagents and chemicals specified below does not necessarily correspond with the description in the question paper. Candidates MUST NOT be informed of the difference.

2. Candidates are not allowed to use reference books (i.e. text books, booklets on qualitative analysis etc) during the examination.

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

- ✓ **BA1** is made by dissolving 4g of sodium hydroxide pellets in distilled water to make 1 litre of solution. [Each candidate needs 100 cm^3]
- ✓ **BA2** is made by dissolving 8.60 cm^3 of concentrated hydrochloric acid in distilled water to make 1 litre of solution. [Each candidate needs 100 cm^3]
- ✓ Methyl orange indicator
- ✓ 1 burette 50 cm^3

- ✓ 1 pipette (20.0 / 25.0 cm^3)
- ✓ 2 conical flasks
- ✓ 1g substance K which is a mixture of copper (II) sulphate-5-water and aluminium sulphate-6-water in the ratio of 1:1.
- ✓ Reagents for testing gases, cations and anions
- ✓ 8 test tubes
- ✓ Heat source

END