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 during the examination.

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

1 pipette (**20 or25 cm^3**)
1 burette (**50cm^3**)
2 conical flasks
6 test tubes
1 boiling tube
2 filter paper
100 cm^3 of BA1
60 cm^3 of BA2
3g of **Z**
Phenolphthalein indicator

- Easy access to common laboratory reagents for identifying cations and anions
- **BA1** is 0.1 M sodium hydroxide solution
- **BA2** is 0.08M sulphuric acid solution
- **Z is a mixture of $ZnCO_3 + PbCO_3$ in a ratio of 3:2**

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Name: ..... Index No:.....

Signature: ..... School .....

545/3
CHEMISTRY
Paper 3
July/Aug. 2022
2 hours

UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

Uganda Certificate of Education

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.*

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 calculators may be used.

For Examiner's Use Only	
Question	*Marks*
1.	
2.	
Total	

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Turn Over

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1. **You are provided with the following;**

BA1 which is solution made by dissolving 2g of sodium hydroxide in water to make 500cm^3 of the solution
BA2 Which is a solution made by dissolving 9.6 g of acid H_nX to make one liter of solution

You are required to determine the reaction ratio between the acid and sodium hydroxide and hence the basicity of the acid.

PROCEDURE
Pipette **20.0** or **25.0** cm^3 of **BA1** into a clean conical flask. Add **2-3** drops of phenolphthalein indicator and titrate the mixture with **BA2** from the burette. Repeat the titration **2-3** times to obtain consistent results. Record your results in the Table below.

Results:

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

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **BA2** used (cm^3)			

(9 marks)

Titer values used to calculate average volume of **BA2** used *(½ mark)*

.....

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

Questions
(a) Calculate the number of moles of sodium hydroxide (NaOH),
(i) In 500 cm^3 of **BA1** **(Na=23, O=16, H=1** *(2 marks)*

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

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(ii) That reacted. *(2 marks)*

.....

.....

.....

.....

(b) Calculate the;

(i) Molarity of the acid (H_nX) in BA2 *(2 marks)*
(120g of acid H_nX contain 1 mole)

.....

.....

.....

.....

(ii) Moles of the acid in BA2 that reacted. *(2 marks)*

.....

.....

.....

.....

.....

(c) Determine the reaction ratio between sodium hydroxide and acid H_nX. *(2 marks)*

.....

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.....

(d) Write the equation for the reaction between sodium hydroxide and Acid H_nX and hence determine the value of **n**. *(2 marks)*

.....

.....

.....

.....

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

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Heat two spatula ends full of Z strongly in a dry test tube until there is no further change.		
(b) Dissolve two spatula ends full of Z in minimum dilute nitric acid. To the resultant solution add ammonia solution drop wise until in excess. 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 resultant acidic solution into two portions.		
(i) To the first portion add sodium hydroxide solution drop wise until in excess		
(ii) To the second add ammonia solution drop wise until in excess		

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(d) Wash the residue and dissolve it in minimum dilute nitric acid. Divide the resultant solution into 3 portions.		
i) To the first portion add sodium hydroxide solution drop wise until in excess		
ii) To the second portion add ammonia solution drop wise until in excess		
iii) To the third portion add 3-4 drops of sodium sulphate solution		

(e) (i) Cations in Z :..... and .....

(ii) Anion in Z.....

END

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