STUDENT'S NAME: ……

SCHOOL NAME: …… INDEX NUMBER ……

545/4
CHEMISTRY
Paper 4
(Practical)
July/Aug. 2022
2 Hours

AITEL JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

(PRACTICAL)

Paper 4

2 hours

INSTRUCTIONS TO CANDIDATES:

Answer **all** *questions*

Record your answers in this question paper in the spaces provided

Mathematical tables and non-programmable scientific calculators may be used

Reference books i.e. text books and books of qualitative analysis should ***not*** *be used*

FOR EXAMINERS USE ONLY		
QN 1	**QN 2**	**Total**

Turn Over

1. You are provided with the following

BA3 which is a 2M Hydrochloric acid.

BA4 which is a 2M sodium hydroxide solution.

You are required to determine the molar heat of neutralization.

Procedure

By use of a measuring cylinder, transfer $25cm^3$ of **BA3** into a plastic beaker. Stir with the thermometer and record the initial steady temperature of the solution as $\mathbf{T_1}$.

Measure $25cm^3$ of **BA4** by use of a clean measuring cylinder and record its initial steady temperature $\mathbf{T_2}$.

Mix the two solutions in a plastic beaker. Note the highest temperature reached by the solution.

Record your results in the table below. (05 marks)

Initial temperature of **BA3,** $\mathbf{T_1}$ (^{0}c)	
Initial temperature of **BA4,** $\mathbf{T_2}$ (^{0}c)	
Average Initial temperature , $\mathbf{T_3} = \left(\frac{\mathbf{T_1}+\mathbf{T_2}}{\mathbf{2}}\right)$ (^{0}c)	
Highest temperature reached by the solution	
Temperature rise	

Questions

(a) Calculate the number of moles of **BA3** that reacted. (04 marks)

(b) Calculate the number of moles of **BA4** that reacted. (04 marks)

(c) (i) Calculate the heat of neutralization (specific heat capacity of solution is 4.2J/g/^{0}c, density of solution is 1g/cm^3). (06 marks)

(ii) Write an ionic equation that took place. (02 marks)

(d) Calculate the molar heat of neutralization of sodium hydroxide. (03 marks)

2. You are provided with substance **X** which contains two cations and a single anion. Carryout the following tests to identify them. Identify any gas(es) which may be evolved. Write your observations and deductions in the table below.

Tests	**Observations**	**Deductions**
(a) Heat a spatula endful of **X** in a dry boiling tube strongly until there is no further change		
(b) dissolve a spatula endful of **X** in about $6cm^3$ of distilled water and followed by $5cm^3$ sodium hydroxide solution. Filter and keep both the filtrate and the residue.		
Add dilute nitric acid to the filtrate until the solution is just acidified. Divide the resultant solution into portions (i)To the first potion ,add sodium hydroxide dropwise until in excess.		
(ii)To the second portion, add Ammonia solution dropwise until in excess		

(iii) To the third portion, add 2-3 drops of potassium iodide		
(iv) To the fourth portion, add 3-4 drops of lead (II) nitrate followed by dilute nitric acid		
(v) To the fifth portion, add 3-4 drops of barium nitrate followed by dilute nitric acid		
(vi) Use the sixth part to carry out a test of your own to confirm the anion present		
(d)Wash the residue with dilute nitric acid and divide the resultant solution into two parts (i)To the first portion, add sodium hydroxide dropwise until in excess, leave it to stand		

(ii)To the second portion, add ammonia solution dropwise. Allow it to stand.		

Identify the

Cations in **X** ……. and …….

Anion in **X**……..