Candidates' Name: ……..……..

Signature: ……..…..……

Random No.					Personal No.		

(Do not write your school / Center name or Number anywhere on this booklet)

545/3
CHEMISTRY
(PRACTICAL)
Paper 3
July/Aug. 2023
2 hours

KAMTEC EXAMINATIONS BOARD

Uganda Certificate of Education
CHEMISTRY PRACTICAL

Paper 3

2 hours

INSTRUCTIONS TO CANDIDATES

Attempt **all** *questions.*
All answers must be written in the spaces provided in the booklet.
You are ***not*** *allowed to use any reference books i.e., text books or handouts on qualitative analysis etc.*
All working must be clearly shown.
Mathematical tables, slide rules and silent non-programmable calculators may be used.

For Examiner's use only		
Q.1	**Q.2**	**Total**

 TURN OVER

1. You are provided with the following.

BA1 which is a solution containing 6.32g of a hydrated acid compound X of formular $A.nH_2O$, in $500cm^3$ of solution.

BA2 which is a 0.2M alkaline solution Y

You are required to determine the value of A in the hydrated acid compound.

(1 mole of the acid reacts with 2 moles of the hydroxide ions in alkaline solution Y.

Procedure

i. Pipette 25.0(0r 20.0) cm^3 of BA2 into a clean plastic beaker. Measure and record its initial temperature.

ii. Fill the burette with BA1, and then run $10cm^3$ of BA1 from the burette into the beaker containing BA2.

iii. Carefully stir the solution using a thermometer, and record the maximum temperature attained the mixture.

iv. Repeat procedure (i) and (ii) above using volumes of BA1 15, 20, 25 and $30cm^3$

v. Record your results in the table below.

Results

Initial temperature of ***BA2***: ……...…….……cm^3 ($\frac{1}{2}$ Mark)

Volume of pipette used: ……..……..….cm^3 ($\frac{1}{2}$mark)

Volume of BA1 added (cm^3)	10	15	20	25	30
Maximum temperature attained (^{o}c)					
Temperature change (^{o}c)					

(5marks)

Questions

a)

i. Plot a graph of temperature change (along vertical axis) against volume of BA1 added (along vertical axis). ($5\frac{1}{2}$marks)

(USE A GRAPH PAPER, INSERT IT IN THE BOOKLET AND STAPLE IT)

ii. Using your graph, determine the volume of BA1 required for complete neutralization of BA2. (1mark).

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b) Calculate the;

I. number of moles of hydroxide ions in BA2 that reacted. ($2\frac{1}{2}$ mark)

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II. number of moles of hydrated acid compound in BA1 that reacted with the hydroxide ions. ($1\frac{1}{2}$mark)

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III. number of moles the hydrated acid compound in 1000cm^3 of the solution. (2marks)

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IV. the mass of one mole of the acid compound. (n=10, H=1, O=16). ($2\frac{1}{2}$ mark)

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c) Determine the value of **A** in the acid compound. (2 marks)

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

TEST	OBSERVATION	DEDUCTION
a. Heat two spatula end-fuls of **J** in dry test tube until there is no further change.		

b. To about 7cm3 of distilled water, add 2 spatula end-fuls of **J** and shake well. To the solution, add sodium hydroxide dropwise until excess. Filter, keep both filtrate and residue.		
c. To the filtrate, add dilute nitric acid drop wise until the solution is **just acidic.** Divide the solution into six portions		
i. To the first portion, add sodium hydroxide solution dropwise until excess.		
ii. To the second portion, add 3 drops of dilute sulphuric acid.		
iii. To the third portion, add ammonia solution drop wise until excess		
iv. To fourth portion 3 drops of potassium iodide solution.		
v. To the fifth portion, add lead (II) nitrate solution and warm.		

vi. Use the sixth portion to carry out a test of your own choice to confirm the anion in J. **TEST:** ……..... …….. …….. ……..		
d. Wash the residue from (c) with water and dissolve it in dilute sulphuric acid. Divide the resultant solution into two portions.		
i. To the first portion, add sodium hydroxide solution drop wise until excess.		
ii. To the second portion, add ammonia solution dropwise until excess.		

i. Cations in J:

……..and…….

ii. Anion in J:

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END