Candidate's Name ……

Signature …….....

Random No.					*Personal No.*		

545/3

CHEMISRY

(***PRACTICAL***)

***PAPER* 3**

2 *Hours*

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 booklet. Use **blue** or **black** ink ball pen only. Any work done in **pencil** will not be marked except drawings.*

*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 the following:
   BA1, which contains 8.0g of sodium hydroxide per litre of solution.
   BA2, which contains 12.0g of an organic acid, C_xH_yCOOH per litre of solution.
   You are required to determine the formula and hence the name of an organic acid C_xH_yCOOH

   Procedure

   Pipette 20.0 (or 25.0cm^3) of **BA1** into a clean conical flask. Add 2-3 drops of phenolphthalein indicator and shake the mixture.
   Titrate the mixture with **BA2** from the burette until the end point.
   Repeat the titration until you obtain consistent results.
   Record your results in the table below.

   Results:

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

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

($4\frac{1}{2}marks$)

   Volume of **BA2** used in calculating average volume ($\frac{1}{2}\,mark$)

   ……
   ……

   Average volume of **BA2** used ($2\frac{1}{2}\,marks$)

   ……
   ……cm^3

   Questions:

   (a) Write the equation for the reaction between **BA1** and **BA2.**($1\frac{1}{2}\,marks$)

   ……
   ……

(b) Calculate the;

(i) Number of moles of sodium hydroxide in one litre of solution **BA1** $(Na = 23; O = 16; H = 1)$ $(1\frac{1}{2}\, marks)$

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(ii) Number of moles of sodium hydroxide in **BA1** that reacted with the acid in **BA2**$(1\frac{1}{2}\, marks)$

……
……
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……

(iii) Number of moles of the acid in **BA2** that reacted with sodium hydroxide in **BA1**. $(1\ mark)$

……
……
……
……
……

(c) Determine the;

(i) The molar mass of the acid $(2marks)$

……
……
……
……

……
……

(ii) Value of x in the acid C_xH_yCOOH
($C = 12; O = 16; H = 1$ *and that* $y = 3x$) ($1\frac{1}{2} marks$)

……
……
……
……
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……

(d) Hence write the;

(i) Structural formula of the organic acid. ($\frac{1}{2}\, mark$)

……
……
……
……

(ii) Name of the acid ($\frac{1}{2}\, mark$)

……
……

2. You are provided with substance **Z**, which contains **two** cations and **one** anion. You are required to carry out the following tests on **Z** to identify the cations and the anion in **Z**. identify any gas(es) that may be given off and record your observations and deductions in the table below;($32\ marks$)

	TESTS	*OBSERVATIONS*	*DEDUCTIONS*
(a)	Heat two spatula end-fuls of **Z** strongly in a dry test tube. Keep the residue.		

(b)	Cool the residue from (a) and dissolve it in about $3cm^3$ of dilute nitric acid. Warm if necessary. To the resultant solution add dilute ammonia solution drop wise until in excess and filter. Keep both the residue and the filtrate.		
(c)	To the filtrate, add dilute nitric acid drop wise until the solution is just acidic. Divide the filtrate into two parts. (i) To the first part of the acidified filtrate, add dilute sodium hydroxide solution drop wise until in excess.		
	(ii) To the second part of the acidified filtrate, add dilute ammonia solution drop wise until in excess.		
(d)	Wash the residue with dilute ammonia solution and then distilled water. Transfer it to a clean test tube and add dilute nitric acid drop wise until the residue just dissolves. Divide the resultant solution into four portions.		

	(i) To the first portion, add sodium hydroxide solution drop wise until in excess.		
	(ii) To the second portion, add dilute ammonia solution drop wise until in excess.		
	(iii) To the third portion, add 2-3 drops of dilute sulphuric acid.		
	(iv) Use the fourth portion to carry out a test of your choice to confirm one of the cations in Z.		

(e) (i) The cations in Z are ……and……

(ii) The anion in Z is …….

Confidential

Each candidate will require;

1 burette (50ml)

1 pipette 25.0ml (or 20.0ml)

2 conical flasks

6 test tubes

100ml of ***BA1***

100ml of ***BA2***

2.5g of ***Z***

1 filter paper.

Easy access to:

-heat source.

-Reagents for identifying cations and anions and gases.

-phenolphthalein indicator

-distilled water.

BA1 *is prepared by dissolving 4g of sodium hydroxide to make one litre of solution*

BA2 *is 0.05M sulphuric acid or 0.1M hydrochloric acid.*

Z *is a mixture of zinc oxide and lead(II)nitrate in the ratio of 2:1 respectively.*