Name ..... Centre / Index No ...../.....

School ..... Signature .....

P525/3
CHEMISTRY
(PRACTICAL)
Paper 3
$3^1/_4$ hours

WAKISSHA

Uganda Advanced Certificate of Education

CHEMISTRY
PRACTICAL

Paper 3

3 hours 15 minutes

Instructions to Candidates:

- *Answer* **all** *questions.*
- *Record your answers on this question paper in the spaces provided.*
- *Mathematical tables and silent non-programmable calculators may be used.*
- *Reference books (i.e, textbooks, books on qualitative analysis etc.) should* **not** *be used.*
- *Candidates are* **not** *allowed to start working with the apparatus for the first 15 minutes. This time is to enable candidates to read the question paper and make sure they have all apparatus and chemicals that they may need.*

For Examiners' Use Only			
Q.1	Q.2	Q.3	Total

1. You are provided with the following.
GA1; which is approximately 0.1M sodium thiosulphate solution.
GA2;.which is a solution prepared by dissolving 1.0g of Potassium iodate in 250cm^3 of distilled water.
Liquid E; which is a commercial bleaching agent containing sodium hypochlorite
GA3; which is 0.5M potassium iodide
GA4; which is 1.0M sulphuric acid

You are required to:
(i) Standardize **GA1** using **GA2**
(ii) Determine the percentage of chlorine in the commercial bleaching agent.

Theory

In acidic medium, Iodate ions react with Iodide ions according to the equation
$IO_{3\,(aq)}^{-} + 6H^{+}_{(aq)} + 5I^{-}_{(aq)} \longrightarrow 3I_{2(aq)} + 5H_2O_{(l)}$

In acid medium hypochlorite ions produce chlorine according to the following equation.
$Cl^{-}_{(aq)} + OCl_{(aq)} + 2H^{+}_{(aq)} \longrightarrow H_2O_{(l)} + Cl_{2(aq)}$

The chlorine produced displaces Iodine from Potassium Iodide
$Cl_{2(aq)} + 2I^{-}_{(aq)} \longrightarrow I_{2(aq)} + 2Cl^{-}_{(aq)}$

Procedure A

Pipette 10.0cm^3 of **GA2** into a conical flask and add 10.0cm^{3}of **GA4** followed by 10.0cm^3 of **GA 3**.

Titrate the liberated Iodine with **GA1** from the burette until the mixture is pale yellow.

Add 2cm^{3}of starch and continue with the titration until the end point.

Repeat the titration until you obtain consistent results.

Record your result in the table 1 below.

Volume of pipette used _____ cm^3 (0½ mark)

Table 1

Final burette reading (cm^3)			
Initial burette reading(cm^3)			
Volume of **GA1** used(cm^3)			

(04½ marks)

Titre value of **GA1** used to calculate the average volume. (½ mark)

_____

Average volume **GA1** (02½ mark)

_____

_____

Question

Calculate the molar concentration of **GA1.** (6 mark)

Producer B

Measure 30.0cm^3 of liquid E into 250cm^{3}volumetric flask. Add distilled water up to the mark. Label the solution **GA5.**

Pipette 10.0cm^3 of GA5 into a conical flask. Add 10cm^3 of **GA4** followed by 10.0cm^3 of **GA3.**

Titrate the liberate Iodine with **GA1** from the burette until the mixture is pale yellow. Add 1cm^3 of starch indicator and continue with the titration until it turns colourless. Repeat the titration two more times and record your results in table II below.

Results

Volume of pipette used _____ cm^3 (½ mark)

Table 2

Final burette reading(cm^3)			
Initial burette reading(cm^3)			
Volume of **GA1** used(cm^3)			

(04½ marks)

Titre values used to calculate average volume of **GA1** used (½ mark)

Average volume of **GA1** used. (02½ mark)

Turn Over

Questions

Calculate the;

(i) Number of moles of sodium thiosulphate in **GA1** that reacted. (01½ mark)

(ii) Number of moles Iodine liberated by 10.0cm^3 of **GA5** (01mark)

(iii) Number of moles of aqueous chlorine in 30cm^3 of **E** (02½ marks)

(iv) The mass of aqueous chlorine in 30cm^3 of **E**. (C*l* = 35.5) (02 marks)

(v) Percentage of mass of aqueous chlorine in **E**. (01 mark)

2. You are provided with substance **W,** Which contains three cations and one anion. You are required to carry out the following tests on **W**, to Identify the cations and anion in **W**. Identify any gase(s) evolved.
Record your observations and deductions in the table below.

Tests	Observations	Deductions
a) Heat a spatula endful of **W** strongly in a dry test tube.		
b) Shake two spatula endfuls of **W** with about $4cm^3$ of water, add dilute sodium hydroxide solution to the mixture drop- wise until in excess. Warm and 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 acidic solution into six parts		
(i) To the first part of the solution, add dilute sodium hydroxide solution drop wise until in excess. Warm the mixture.		
(ii) To the second part of the solution, add 2-3 drops of Potassium Iodide solution.		
(iii) To the third part of the solution add dilute ammonia solution drop wise until in excess.		
(iv) Use the fourth part of the solution to carry out a test of your own choice to identify one of the Cations in **W.**		

(v) To the fifth part of the solution, add 2-3 drops of lead(II) nitrate solution.		
(vi) Use the sixth part to carry out a test of your own choice to confirm the anion in **W**		
d) Wash the residue with water and dissolve it in dilute hydrochloric acid. Divide the solution into three parts.		
(i) To the first part of the solution, add dilute sodium hydroxide solution drop wise until in excess.		
(ii) To the second part of the solution, add ammonia solution drop wise until in excess		
(iii) Use the third part carry out a test of your own choice to confirm one of the Cations in W.		

e) (i) The anions in **W** is _____

(ii) Cations in **W** _____, _____ and _____,

3. You are provided with substance **Q** which is an organic compound. You are required to determine the nature of **Q**. Carry out the following tests on **Q**. and record your observations and deductions in the table below.

Test	Observation	Deductions
a) Burn a spatula endful of **Q** on a porcelain dish or spatula end.		
b) To about $3cm^3$ of **Q** in a test tube, add, about $3cm^3$ of water, shake and allow to stand. Then test the mixture with litmus paper. Divide the resultant mixture in to 5 portions.		
(i) To the first portion of the mixture add 3-4 drops of neutral iron (III) chloride solution.		
(ii) To the second portion of the mixture, add half a spatula endful of solid sodium hydrogen carbonate.		
(iii) To the third portion of the mixture add 2 - 3 drops of 2, 4 - dinihophenyl hydrazine.		
(iv) To the forth portion of the mixture, add an equal volume of ethanol followed by 2-3 drops of concentrated sulphuric acid. Heat the mixture and allow to stand. Then pour into a small beaker of water		
(v) To the fifth portion of the mixture, add 3-4 drops of acidified potassium dichromate solution and heat.		

Turn Over

c) To about 1cm^3 of silver nitrate solution in boiling tube, add an equal volume of sodium hydroxide solution followed by dilute ammonia solution until the precipitate formed just dissolves. Then add about 1cm^{3}of **Q** and boil in water bath for about 5-minutes. Allow to cool under running tap water.		

d) Comment on the nature of **Q**

_____

_____

_____

_____

END