

Name Centre / Index No/.....
School Signature

P525/3
CHEMISTRY
(PRACTICAL)
Paper 3
3¹/₄ 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

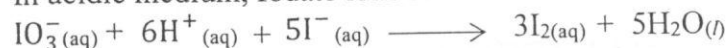
1. You are provided with the following.
GA1; which is approximately 0.1M sodium thiosulphate solution.
GA2; which is a solution prepared by dissolving 1.0g of Potassium iodate in 250cm³ of distilled water.
Liquid E; which is a commercial bleaching agent containing sodium hypochlorite
GA3; which is 0.5M potassium iodide
GA4; which is 1.0M sulphuric acid

You are required to:

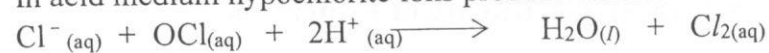
- Standardize **GA1** using **GA2**
- Determine the percentage of chlorine in the commercial bleaching agent.

Theory

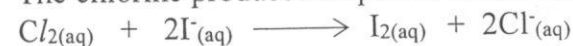
In acidic medium, Iodate ions react with Iodide ions according to the equation



In acid medium hypochlorite ions produce chlorine according to the following equation.



The chlorine produced displaces Iodine from Potassium Iodide



Procedure A

Pipette 10.0cm³ of **GA2** into a conical flask and add 10.0cm³ of **GA4** followed by 10.0cm³ of **GA3**.

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

Add 2cm³ 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 _____ cm³ (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)

Calculate the molar concentration of GA1.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Measure 30.0cm³ of liquid E into 250cm³volumetric flask. Add distilled water up to the mark. Label the solution **GA5**.

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.

Volume of pipette used _____ cm³ (½ mark)

Table 2			
Final burette reading(cm^3)			
Initial burette reading(cm^3)			
Volume of GA1 used(cm^3)			

Titre values used to calculate average volume of GA1 used

Average volume of GA1 used.

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Calculate the;

Calculate the;

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

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- (ii) Number of moles Iodine liberated by 10.0cm³ of **GA5** (01mark)

- (iii) Number of moles of aqueous chlorine in 30cm³ of E (02½ marks)

- (iv) The mass of aqueous chlorine in 30cm³ of E. (Cl = 35.5) (02 marks)

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

[illegible]

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 - dinitrophenyl 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.		

<p>c) To about 1cm³ 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 1cm³ of Q and boil in water bath for about 5-minutes. Allow to cool under running tap water.</p>		
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d) Comment on the nature of Q

END