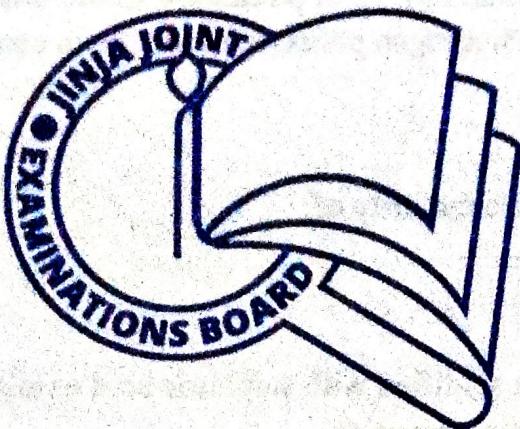


Name..... Center/Index number...../.....

PS25/3
CHEMISTRY
Paper 3
August, 2024
3½ hours



JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS –AUGUST, 2024

CHEMISTRY

PRACTICAL

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

- Answer all questions.
- Answers are to be written in the spaces provided.
- You are not allowed to use any reference books.
- Mathematical tables, slide rulers and non-programmable silent electronic calculators may be used.
- Candidates are not allowed to start working with the apparatus for the first 15 minutes. This time is to ensure that they have all the chemicals and apparatus they may need.
- Atomic masses: C=12, O=16, H=1, N=14, Cl=35.5

For Examiner's Use Only

Q1	Q2	Q3	TOTAL

1. You are provided with the following,

FA1 which is approximately 0.1M sodium thiosulphate.

FA2 which is a solution containing 1g of potassium iodate dissolved in 250cm³ of water.

FA3 which is a solution of hydrogen peroxide of unknown concentration.

10% potassium iodide.

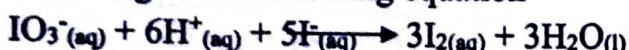
2M sulphuric acid.

You are required to determine the molarity of;

- i) FA1
- ii) FA3

Theory

Potassium iodate when acidified with sulphuric acid oxidizes potassium iodide according to the following equation



Hydrogen peroxide when acidified with sulphuric acid oxidizes potassium iodide according to the following equation.



Sodium thiosulphate reduces iodine according to the following equation.



PROCEDURE I

Pipette 10cm³ of FA2 and add 10 cm³ of 2M sulphuric acid followed by 10cm³ of 10% potassium iodide solution. Titrate the liberated iodine with FA1 until the solution turns pale yellow. Then add 5 drops of starch indicator and continue titrating until the end point. Repeat the titration until you get consistent results. Record your results in the table below.

Results;

Volume of pipette used.....cm³

(1/2 mk)

Table I

Titre	1	2	3
Final burette reading/ cm ³			
Initial burette reading/ cm ³			
Volume of FA1 used/ cm ³			

Titre values used to calculate average

volume.....

Calculate the average volume of FA1

used.....

Calculate,

- a) Moles of IO_3^- ions that reacted ($K=39$, $O=16$, $I=127$)

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

- b) Moles of iodine liberated

- c) Moles of $S_2O_3^{2-}$ ions that reacted

the following steps and left at
the end of each step a sample of the
material obtained at that stage.

d) Molarity of $\text{S}_2\text{O}_3^{2-}$ ions in FA1

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

PROCEDURE II

Measure 4cm^3 of FA3 and transfer it into a 100cm^3 measuring cylinder. Add water to it to top to the mark. Label the resultant solution FA4. Pipette 10cm^3 of FA4 into a clean conical flask and then add 10cm^3 of 2M sulphuric acid followed by 10cm^3 of 10% potassium iodide solution. Titrate the liberated iodine with FA1 from the burette until the solution turns pale yellow. Add 5 drops of starch indicator and continue titrating until the end point. Repeat the procedure until you get consistent results.

RESULTS

Volume of pipette used=.....cm³

Table II

Titre	1	2	3
Final burette reading/ cm ³			
Initial burette reading/ cm ³			
Volume of FA1 used/ cm ³			

Titre values used to calculate average

volume.....

Calculate the average volume of FA1

used.....

c) Calculate the,

(i) number of moles $S_2O_3^{2-}$ ions that reacted.

MONTEBELLO
MONTEBELLO

(ii) moles of hydrogen peroxide solution in 10cm^3 of FA4.

1. **What is your name?**
My name is John Smith.

2. **How old are you?**
I am 12 years old.

3. **What is your address?**
My address is 123 Main Street, Anytown, USA.

4. **What is your phone number?**
My phone number is (555) 123-4567.

5. **Do you have any pets?**
Yes, I have a dog named Max.

(iii) molar concentration of hydrogen peroxide in FA3.

WILHELMUS VON HANAU
KURFÜRST VON BRUNSWICK
HERZOG VON SCHAUMBURG
HERZOG VON LÜNEBURG
HERZOG VON BENTHEM

2. you are provided with substance X which contains two cations and two anions. You are required to identify the cations and anions in X. carry out the tests below and record your observations and deductions in the table below. Where a gas (es) is evolved, it must be identified. (34 marks)

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat a spatula end full of X in a hard glass tube first gently and then strongly until there is no further change.		
b) To two spatula endful of X, add half a spatula end full of manganese (iv) oxide followed by 4 to 5 drops of concentrated sulphuric acid and heat gently.		
c) Put three spatula endful of X in a test tube. Add dilute nitric acid drop wise until there is no further change. Decant off the solution and divide the resultant solution into two parts.		
d) To the first part of the resultant solution in (c), add dilute sodium hydroxide solution dropwise until in excess. Shake and filter. Keep both the filtrate and residue.		
e) To the filtrate from (d), add dilute nitric acid drop wise until the solution is just acidic.		

Divide the acidic filtrate into five portions.

- i) To the first portion of the acidified filtrate, add sodium hydroxide solution dropwise until in excess.

- ii) To the second portion of the acidified filtrate, add ammonia solution drop wise until in excess.

- iii) Use the third portion of the acidified filtrate to carry out a test of your own to confirm one of the cations in X. Record test and observations.
Test

- f) Wash the residue and dissolve it in dilute sulphuric acid. Divide the acidic solution into three portions.

- i) To the first portion of the acidic solution, add dilute sodium hydroxide solution dropwise until in excess.

Leave out of test to nothing
positive colour
become blue
negative colour
do test a few times

no colour
add ammonia
in excess because
test barium X
negative colour
do test a few times

barium chloride is
insoluble to noq
out of solution
negative colour

test out of
add to colour
the result
to aqua + or
starch + or
copper
+ or malachite
green colour

negative
blue colour
brown colour
negative out of
out to nothing
blue colour

to aqua + or
barium + or
blue colour
green colour
starch colour
red colour

<p>ii) To the second portion of the acidic solution, add ammonia solution dropwise until in excess.</p>		
<p>iii) To the third portion of the acidic solution, carry out a test of your own to confirm the second cation in X. Record test and observation. Test:</p>		
<p>g) Divide the second part of the resultant solution in (c) into three portions.</p>		
<p>(i) To the first portion of the filtrate, add 3 to 4 drops of silver nitrate solution followed by ammonia solution dropwise until in excess.</p>		
<p>(ii) To the second portion of the filtrate, add 1 to 2 drops of concentrated nitric acid followed by sodium thiosulphate solution dropwise until in excess.</p>		

(iii) To the third portion of the filtrate, add 4-5 drops of Lead (ii) nitrate solution.		
--	--	--

b) Identify the:

- (i) Cations in X.....and.....
....
- (ii) Anions in X.....and.....
....

3. You are provided with an organic substance P. you are required to determine the nature of P. carry out the following tests on P and record your observations and deductions in the table below.

(16 marks)

TESTS	OBSERVATIONS	DEDUCTIONS
a) Burn a small amount of P on a spatula end or in a porcelain dish		To find nature of P To decide if P is an organic substance
b) To 1cm ³ of P, add about 2cm ³ of water and Shake. Divide the mixture into three parts.		Whether P is soluble in water or not Whether P is acidic or basic
(i) To the first part of mixture, add 3-4 drops of neutral Iron (iii) chloride solution.		To find out if P is organic
(ii) To the second part of mixture, add 3-4 drops of sodium carbonate solution.		
(iii) To the third part of mixture, add 5-6 drops of acidified		

potassium dichromate solution and heat.		
c) To about 0.5cm^3 of P, add 5-6 drops of Brady's reagent.		
d) To a boiling tube, add 1cm^3 of silver nitrate solution followed by 3 drops of sodium hydroxide solution then add ammonia solution dropwise until the precipitate just dissolves. Then add 1cm^3 of P and heat gently on a water bath for about 3 minutes and allow to cool.		
e) To about 0.5cm^3 of P, add 2-3 drops of sodium hydroxide solution followed by iodine solution until the solution is pale yellow. Warm the mixture and allow to stand.		

f) Comment on the nature of P