

NAME:.....INDEX NO.....

SIGNATURE:.....

P525/3
CHEMISTRY PRACTICAL
3¼ HOURS
August 2023



UNNASE MOCK EXAMINATIONS

UGANDA ADVANCED CERTIFICATE OF EDUCATION

CHEMISTRY PRACTICAL

3 HOURS AND 15 MINUTES

INSTRUCTIONS TO CANDIDATES.

- All questions are compulsory
- Answers to be written in the spaces provided
- All your work must be in blue or black ink
- Any work done on pencil will not be marked
- You are not allowed to work with the apparatus for the paper and check whether you have all the chemicals and apparatus.
- All working must be clearly shown.
- Mathematical tables and silent non- programmable scientific calculators may be used.

(O=16, Na= 23, S=32, Mn=55)

FOR EAMINER'S USE ONLY		
Q1		
Q2		
Q3		
TOTAL		

1. You are provided with the following.

FA1: which contains 3.95g of anhydrous sodium thiosulphate, $\text{Na}_2\text{S}_2\text{O}_3$ in 500cm^3 of solution

FA2: Which is hydrogen peroxide solution

Solid T: which is a salt containing manganate (VII) ion.

5% potassium iodide solution.

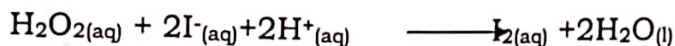
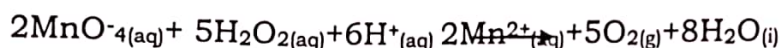
Starch solution

You are required to determine the;

- Concentration of hydrogen peroxide in mol dm^{-3} of FA2
- Percentage of manganese in T.

Theory:

In acidic medium, hydrogen peroxide reacts with Manganese (VII) ions and iodide ions according to the following equations.



The iodine liberated reacts with thiosulphate ions according to the following equations.



PROCEDURES

PART A:

- (a) Using a measuring cylinder, transfer exactly 5.0cm^3 of FA2 into a 250cm^3 volumetric flask.

Make the solution up to the mark with distilled water. Label the solution FA3.

- (b) Pipette 10.0cm^3 of FA3 into a conical flask, add an equal volume of 1M sulphuric acid. Using a measuring cylinder followed by 10cm^3 of 5% potassium iodide solution. Warm the mixture to 50°C and titrate with FA1 from the burette until the solution is pale yellow.

Add starch indicator and continue the titration until the end point. Repeat the titration until you obtain consistent results.

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PROCEDURE

PART B

- (c) Weigh accurately about 0.8g of T and transfer it into a 250cm³ volumetric flask. Add about 100cm³ of 1 M sulphuric acid followed by 15cm³ of FA2. Make the solution upto the mark with distilled water and allow to stand for about five minutes. Label the solutions FA4.
- (d) Pipette 10.0cm³ of FA4 into a conical flask, add an equal volume of 1M sulphuric acid using a measuring cylinder, followed by 10cm³ of 5% potassium iodide solution. Warm the mixture to 50°C and titrate with FA1 from the burette until the solution is pale yellow. Add starch indicator and continue the titration until the end point.
- Repeat the titration until you obtain consistent results. Record your results in table 11 below.

RESULTS:

Mass of weighing bottle + T g (½ mk)

Mass of empty weighing bottle g (½ mk)

Mass of T used g (½ mk)

Volume of pipette used cm³ (½ mk)

Table II

Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of FA1 used (cm ³)			

(4 ½ mks)

Volumes of FA1 used for calculating average volume (½ mk)

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Calculate the average of FA1 used (3 ½ mks)

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Questions:

(a) Calculate the number of moles of

(i) Iodine that reacted with thiosulphate ions in FA1 (2 ½ mks)

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(ii) Excess hydrogen peroxide obtained in 250cm³(2 ½ mks)

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(iii) Hydrogen peroxide that reacted with T (2 ½ mks)

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 (b) Determine the percentage of Manganese in T (04 mks)

2. You are provided with substance P which contains two cations and two anions. You are required to carry out the following tests to identify the ions present in P. Record your observations and deductions in the table below. Identify any gas(es) evolved. (32 marks)

TESTS	OBSERVATION	DEDUCTION
(a) Heat two spatula endfuls of P in a dry test tube strongly until there is no further change.		
(b) To two spatula endfuls of P, add 5cm ³ of distilled water. Shake thoroughly and filter. Keep both the filtrate and residue. Divide the filtrate into three parts.		

(i)	To the first part of the filtrate, add 4 drops of Lead (II) nitrate solution followed by dilute nitric acid.		
(ii)	To the second part of the filtrate, add half a spatula endful of solid sodium hydrogen carbonate followed by 4 – 5 drops of aqueous iodine solution.		
(iii)	Use the third part of the filtrate to carry out a test of your own choice to confirm one of the anions in P. Test:		
(c)	Wash the residue twice with water. Transfer it into a test and add dilute nitric acid dropwise until there is no further change (warm if necessary). Add dilute sodium hydroxide solution dropwise until in excess. Filter and keep both the filtrate and residue.		
(d)	Acidify the filtrate using dilute nitric acid. Divide the solution into three parts		

(i) To the first part of the acidified filtrate add 3-4 drops of dilute Sulphuric acid		
(ii) To the second part of the acidified filtrate add dilute ammonia solution dropwise until in excess.		
(iii) Use the third part of the acidified filtrate to carry out a test of your own choice to confirm one of the cations in P. Test:		
(e) Dissolve the residue from part (c) in a minimum amount of dilute nitric acid. Divide the resultant solution into five parts.		
(i) To the first part of the acidic solution, add dilute sodium hydroxide solution dropwise until in excess.		

(ii)	To the second part of the acidic solution add ammonia solution dropwise until in excess.		
(iii)	To the third part of the acidic solution add 3 drops of potassium chromate (VI) solution followed by Ethanoic acid		
(iv)	To the fourth part of the acidic solution, add excess sodium hydrogen carbonate solution and heat the mixture.		
(v)	Use the fifth part of the acidic solution to carry out a test of your own choice to confirm the second cation in P. Test:		

(f) Identify the

(i) cations in P and

(ii) anions in P and

3. You are provided with substance R which is an organic compound. You are requested to carry out the tests on R to determine the nature of R. Record your observations and deductions in the table below. (18 marks).

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a small amount of R on a spatula end or on a porcelain dish		
(b) To 1cm ³ of R, add about 5cm ³ of distilled water and shake. Divide the mixture into three parts. (i) To the first part add sodium carbonate solution		
(ii) To the second part add Neutral iron (III) chloride solution.		
(iii) To the third part add 5 drops of acidified Potassium dichromate (VI) solution and heat the mixture		

(c) To 1cm ³ of R, add an equal volume of ethanoic acid followed by about 2-3 drops of concentrated sulphuric acid and heat the mixture. Pour the product in a beaker of cold water and allow it to stand.		
(d) To 1cm ³ of R, add tollens reagent and warm.		
(e) To 1cm ³ of R, add about 2cm ³ of iodine solution followed by sodium hydroxide solution dropwise until the colour of iodine is discharged.		

(f) Describe the nature of R.

END



UNNASE MOCKS 2023

ADVANCED-LEVEL CHEMISTRY CONFIDENTIAL

- \ **FA1** 0.05M $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$. 120cm³ each
- \ **FA2** 6% (20v) of hydrogen peroxide 25cm³ each
- \ **T** is solid potassium manganate(VII) 1g each
- \ **1M** sulphuric acid 160 cm³ each
- \ **5%** potassium iodide solution 60 cm³ each
- \ **P** is a mixture of ZnCO_3 / MgCO_3 / Na_2SO_3 (zinc carbonate / magnesium carbonate / sodium sulphite) in a ratio 6:4:1
- \ **R** is butanone (methyl ethyl ketone)

Apparatus

Measuring cylinder (100/50cm³)
Beaker (50cm³)
250cm³ volumetric flask
Burette (50cm³)
Pipette (10 cm³)
6 test tubes

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