P525/3 Inst. Sch.
CHEMISTRY
Practical
Instructions
July/ August 2024

TORORO ARCHDIOCESE EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS 2024

CHEMISTRY PRACTICAL INSTRUCTIONS

P525/3 Inst. Sch.

Paper 3

CONFIDENTIAL

Great care should be taken that the information given below does not reach the candidates either directly or indirectly.

INSTRUCTIONS FOR PREPARING APPARATUS AND CHEMICALS

NB: The Headteacher **must** ensure that the teacher responsible for preparing the apparatus and chemicals, hands in his/her trial results properly sealed in a separate envelope and **firmly** fastened (attached) to the candidates' scripts envelop(s)

1. The description of the reagents and chemicals specified below does not necessarily correspond with the description in the question paper. Candidates must not be informed of the differences.
2. Candidates are not allowed to use reference books (i.e text books, booklets on qualitative analysis etc) during the examination.
3. In addition to the fittings and substances ordinarily contained in a chemistry laboratory, each candidate will require:

1 burette ($50cm^3$)
1 pipette $20cm^3$ (or $25\ cm^3$)
1 measuring cylinder ($50cm^3$ or $100cm^3$)
1Volumetric flask ($250cm^3$)
2 conical flasks
8 test tubes
1 boiling tube
2 filter papers
1 filter funnel
100 cm^3 of **FA1**
$100cm^3$ of **FA2**
1.0g of substance **Y**, which is **$KMnO_4$** crystals
2.5g of **W**(which is **Maleic acid**)
3.0g of **D**
$100cm^3$ of 10% potassium iodide solution
$120cm^3$ of 2M sulphuric acid
Starch indicator(freshly prepared)

Easy access to

- Heat source
- A weighing balance reading to at least one decimal place.
- Common reagents for identifying gases, cations, anions and organic compound.

FA1 is prepared by dissolving 24.8g of sodium thiosulphate- 5 – water crystals to make 1liter of solution.

FA2 is made by dissolving 4.0g of **$K_2Cr_2O_7$** crystals in $200cm^3$ of **$2MH_2SO_4$** then diluting to 1 litre with distilled water

Substance **D** is **Zinc carbonate + Nickel carbonate + potassium bromide in the ratio 2:1:1**

END

Candidate's Name:..... **Index No:**.....

Signature:.....

P525/3
CHEMISTRY
(PRACTICAL)
Paper 3
3 ¼ Hours
July/August 2024

TORORO ARCHDIOCESE EXAMINATIONS BOARD
Uganda Advanced Certificate of Education
MOCK EXAMINATIONS 2024
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 text books, 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 the apparatus* and chemicals that they may need.

(Where necessary use: H = 1, C = 12, O = 16 , Na = 23, K = 39, Mn = 55)

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

1. You are provided with the following;

FA1, which is approximately a 0.1M sodium thiosulphate solution.

FA2, which is a solution containing $4.0gdm^{-3}$ of potassium dichromate (VI)

Solid **Y**, which is a salt containing manganate (VII) ions.

2M sulphuric acid solution.

10% potassium iodide solution

Starch solution.

You are required to standardize **FA1** and use it to determine the percentage by mass of manganese in **Y**.

In acidic solution, dichromate (VI) ions and manganate (VII) ions react with iodide ions according to the following equation.

$$C\,r_2O_7^{2-}(aq) + 14\,H^+(aq) + 6\,I^-(aq) \longrightarrow 2Cr^{3+}(aq) + 3I_2(aq) + 7H_2O(l)$$

$$2Mn\,O_4^-(aq) + 16H^+(aq) + 10I^-(aq) \longrightarrow 2Mn^{2+}(aq) + 5I_2(aq) + 8H_2O(l)$$

The iodine liberated in both cases react with thiosulphate ions according to the equation.

$$I_2(aq) + 2S_2O_3^{2-}(aq) \longrightarrow 2I^-(aq) + S_4O_6^{2-}(aq)$$

PROCEDURE A.

(a) Pipette 20.0 (or 25.0)cm^3 of **FA2** into a conical flask and add $10cm^3$ of potassium iodide solution followed by $10cm^3$ of 2M sulphuric acid using a measuring cylinder.

Titrate the iodine liberated with **FA1**, using starch solution.

Repeat the titration until you obtain consistent results

(i) Record your results in Table 1 below.

Results:

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

Table 1

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

(4 ½ marks)

(i) Volumes of **FA1** used for calculating average volume

.....cm^3((½ mark)

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(ii) Average volume of **FA1** used .....cm^3((2½ mark)

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Question:

(a) Calculate the number of moles of iodine liberated by **FA2.**

(Cr = 52, K = 39 , O = 16) (2 ½ marks)

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(b) Determine the concentration of **FA1** in moldm^{-3}. (2 marks)

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PROCEDURE B

(b) Weigh accurately about 0.5g of Y. Dissolve it in about 100cm^3 of distilled water and transfer the solution into a 250cm^3 volumetric flask. Make the solution up to the mark with distilled water and label it **FA3**.

Pipette 20.0(or 25.0) cm^3 of **FA3** into a conical flask and add 10cm^3 of potassium iodide solution followed by 10cm^3 of 2M sulphuric acid. Titrate the iodine liberated with **FA1** using starch indicator until the end point.

Repeat the titration to obtain consistent readings.

(i) Record your results in table II below.

Results:

Mass of weighing container + Y.....g(½ mark)

Mass of weighing container.....g(½ mark)

Mass of Y used.....g(½ mark)

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

Table II

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

(4 ½ marks)

(i) Volume of **FA1** used for calculating average volume

.....cm^3(½ mark)

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(ii) Average volume of **FA1** used.....cm^3(2 ½ mark)

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Questions

(a) Calculate the number of moles of iodine liberated by **FA3**. (2 marks)

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Determine the:

(i) Concentration of **FA3** in moldm^{-3}. (2 ½ marks)

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(ii) Mass of manganese in **Y** and hence its percentage (Mn = 55).

(3 ½ marks)

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2. You are provided with substance D which contains **two** cations and **two** anions. Carry out the following tests on **D** and identify the cations and anions in it. Identify any gas(es) evolved. Record your results in the table below. **(30 marks)**

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Heat **two** spatula endfuls of **D** in a dry test tube, first gently then strongly until there is no further change.		
(b) To **two** spatula endfuls of **D** in a test tube, add about 5cm^3 of water shake and filter. Keep both the filtrate and residue.		
(c) Divide the filtrate from (b) into three portions. (i) To the first portion, add 3-4 drops of lead (II) nitrate solution.		

(ii) To the **second** portion, add 2- 3 drops of silver nitrate solution followed by excess ammonia solution.		
(iii)To the **third** portion, add 4 drops of sodium chlorate (I) solution then 3 drops of concentrated nitric acid followed by 2 -3 drops of tetra Chloromethane. Shake and allow to stand.		
(c) To the residue from (b), add about $5cm^3$ of dilute nitric acid drop wise with shaking on each addition until there is no further change.		
(d) To the resultant solution from (c), add dilute sodium hydroxide drop wise until in excess. Shake and filter. Keep both the filtrate and residue.		
(e) To the filtrate form(d) in a boiling tube, add dilute nitric acid drop wise until the solution just becomes acidic. Divide the acidic solution into three portions.		

(i) To the **first** portion of the acidified filtrate, add dilute solution of sodium hydroxide drop-wise until in excess.		
(ii) To the **second** portion of the acidified filtrate, add dilute 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 **D**. Test:		
(f) Wash the residue from (d) and place it in a clean test tube. Then add dilute sulphuric acid to it until there is no further change. Divide the acidic solution into three portions		

(i) To the first portion of the acidic solution, add dilute sodium hydroxide solution drop-wise until in excess.		
(ii) To the second portion of the acidic solution, add dilute ammonia solution drop –wise until in excess.		
(iii) Use the **third** portion of the acidic solution to carry out a test of your own to confirm the second cation in **D**. Test:		

(f) (i) the cations in **D** are:.....and .....

(ii) the anions in **D** are.....and .....

3. You are provided with an organic substance **W**. You are required to identify the nature of **W**.

Carry out the following tests on **W** and record your observations and deductions in the table below.

(20 marks)

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a spatula endful of **W** on a porcelain dish or at the end of a spatula.		
(b) To a spatula endful of **W** in a test tube, add $3cm^3$ of sodium hydroxide solution and shake.		
(c) Shake a spatula endful of **W** with about $5cm^3$ of water and test the solution with litmus. Divide the solution into five parts.		
(i) To the **first** part of the solution, add half a spatula endful of solid sodium hydrogen carbonate.		
(ii) To the **second** part of the solution, add 2- 3 drops of Iron (III) chloride solution.		

(iii) To the **third** part of the solution, add 2-3 drops of potassium dichromate (VI) solution and warm.		
(iv)To the **fourth** part of the solution, add 3 -4 drops of Brady's reagent		
(v)To the **fifth** part of the solution, add 3-4 drops of acidified potassium manganate (VII) solution.		
(d) To a spatula endful of **W**, add about 5 drops of ethanol followed by 3 – 4 drops of concentrated sulphuric acid. Heat the mixture and pour it in a small beaker of cold water. Allow to stand.		

(e) Comment on the nature of W .....

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END