

NAME..... Index number:.....

Signature:.....

P525/3
Chemistry
Paper 3
3¼ Hours

MOCK EXAMINATIONS 2019
Uganda Advanced Certificate of Education

CHEMISTRY PRACTICAL

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer all the 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 need.

For examiner's use only			
Q.1	Q.2	Q.3	TOTAL

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1. You are provided with the following:

CA1, which is a solution of potassium manganate (vii) of unknown concentration.

CA2, which is a **0.05M** solution of iron(ii) ions.

Solid Y, which is an impure salt of ethanedioate (oxalate). RFM of **Y** = 130

2M Sulphuric acid

You are required to standardize **CA1** and use it to determine the percentage of the impurity in **Y**.

Theory

In acidic media, manganate (vii) ions oxidize iron (ii) to iron(iii) and ethanedioate ions to carbon dioxide. The manganate (vii) ions are reduced to manganese (ii) ions and water.

Procedure A:

(a). Pipette **20.0** or **25.0cm³** of **CA2** into a clean conical flask and add an equal volume of **2M** sulphuric acid and titrate the mixture with solution **CA1** from the burette until you get a persistent colour change. Repeat the titration 2-3 times to get consistent results. Enter your results in the table.

Results:

Volume of pipette used:.....cm³

	1	2	3
Final burette reading (cm ³)			
Initial burette reading(cm ³)			

Volume of CA1 used (cm ³)			
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Titre values used for calculating the average volume of **CA1** used:

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Average volume of **CA1** used cm³

Procedure B:

Weigh accurately about **1.0g** of solid **Y** and dissolve it in about **100cm³** of **water** in a beaker.

Transfer the solution into a **250cm³** volumetric flask and make up to the mark with distilled water.

Label the resultant solution **CA3**.

Pipette **20.0** or **25.0cm³** of **CA3** into a clean conical flask and add an equal volume of **2M** sulphuric acid. Warm the mixture to about **60°C** and titrate the warm solution with **CA1** from the burette until you get a persistent colour change. Repeat the titration **2-3** times to get consistent results.

Enter your results in the table.

Results:

Mass of weighing container + **Y** =g

Mass of weighing container =g

Mass of **Y** used =g

Volume of pipette usedcm³

	1	2	3
Final burette reading (cm ³)			

Initial burette reading(cm^3)			
Volume of CA1 used (cm^3)			

Titre values used for calculating the average volume of **CA1** used:

.....

Average volume of **CA1** used cm^3

Questions:

(a). Write the overall equation for the reaction between manganate (vii) ions and;

(i). iron (ii) ions

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(ii). Oxalate ions

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(b) Calculate the

(i) number of moles of manganate (vii) ions that reacted with iron (ii) ions.

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(ii). Percentage of the impurity in solid Y.

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2. You are provided with substance **X** which contains **two cations** and **two anions**. Carry out the following tests on **X** and identify the cations and anions in it. Identify any gases evolved. Record your results in the table below.

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Heat one spatula endful of X in a dry test tube, first gently then strongly until there is no further change.		
(b) To two spatula endfuls of X in a test tube add about 5cm ³ of nitric acid drop wise with shaking until there is no further change.		
(c). To the resultant solution from (b) add dilute sodium hydroxide drop wise until in excess. Shake		

and filter. Keep both the filtrate and residue.		
TESTS	OBSERVATIONS	DEDUCTIONS
(d). To the filtrate form (c), add dilute hydrochloric acid drop wise until the solution just becomes acidic . Divide the acidic solution into six 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). To the third portion of the acidified filtrate, add 2-3 drops of potassium iodide solution		
(iv). To the fourth portion of the acidified filtrate, add 5 drops of litmus solution followed by dilute ammonia solution drop wise until in excess.		

(v). To the fifth portion of the acidified filtrate, add 3-4 drops of lead (ii) nitrate solution		
TESTS	OBSERVATIONS	DEDUCTIONS
(vi). Use the sixth portion of the acidified filtrate to carry out a test of your own to confirm one of the anions in X . Test:		
(d). Wash the residue and dissolve it in dilute hydrochloric acid. 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.		
ii). Use the third portion of the acidic solution to carry out a test		

of your own to confirm one of the cations in W . Test:		
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(e) (i) The **cations in X** are:.....and.....

(ii) The **anions in X** are:.....and.....

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

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

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a spatula endful of W on a spatula end or in a Porcelain dish.		
(b) Transfer two spatula endfuls of W to a test tube containing 5cm ³ of water, warm the mixture and test with litmus. Divide the warm solution into four portions.		
(i). To the first portion, add 3-4 drops of sodium carbonate solution.		
(ii). To the second portion, add 3-4		

drops of neutral iron (iii) chloride solution.		
(iii). To the third portion, add 3-4 drops of acidified potassium dichromate solution.		
(c). Dissolve one spatula endful of W in 2 cm ³ of methanol and add 2-3 drops of Brady's reagent.		
(d). To a spatula endful of W , add 5 drops of ethanol followed by 2-3 drops of concentrated sulphuric acid. Heat the mixture and pour it into a small beaker of cold water. Allow to stand		
TESTS	OBSERVATIONS	DEDUCTIONS
(e). To a spatula endful of W in a test tube, add 3cm ³ of water, warm and add 2-3 drops of acidified potassium manganate (vii) solution.		

Comment on the nature of **W**.

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END

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