

P525/3

CHEMISTRY
(PRACTICAL)

PAPER 3

Jul/Aug 2022

3 ¼ HOURS



BUSOGA REGION JOINT EXAMINATION BOARD

UGANDA ADVANCED CERTIFICATE OF EDUCATION

CHEMISTRY

(PRACTICAL)

Paper 3

3 HOURS 15 MINUTES

INSTRUCTIONS TO CANDIDATES

Answer **all** questions. Use blue or black ink

Any work done in pencil will **not** be marked except drawings

Record your answers on this question paper in the spaces provided

Mathematical tables and silent non – programmable scientific calculators may be used

Reference books (i.e textbooks, booklets on qualitative analysis etc) should **not** be used

Candidates are **Not** allowed to start working with the apparatus for the first 5 minutes.

This time is to enable candidates read the question paper and make sure they have all the apparatus and chemicals they may need

FOR EXAMINER'S USE ONLY			
Q.1	Q.2	Q.3	TOTAL

1. You are provided with the following

FA₁ which is a solution containing 3.0gl^{-1} of potassium iodate

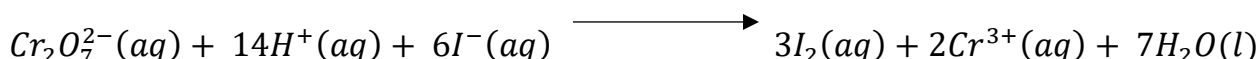
FA₂ which is a solution containing 3.5gl^{-1} of a salt, **MCr₂O₇**

Solid, **S** which is sodium thiosulphate crystals, **Na₂S₂O₃ · 5H₂O**

You are required to;

- (i) prepare and standardize a solution of sodium thiosulphate
- (ii) determine the atomic mass of **M** in **MCr₂O₇**

Iodate ions and dichromate(VI) ions oxidize iodide ions to liberate iodine according to the following equations



(a) **preparing a standardizing sodium thiosulphate solution.**

Weigh accurately about **5.0g** of **S** and dissolve it in about **100cm³** of distilled water.

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

Label the resultant solution **FA₃**

Pipette **20** or **25cm³** of **FA₁** into a clean conical flask, add **20cm³** of **1M** sulphuric acid followed by **10cm³** of **10%** potassium iodide solution

Titrate the mixture with **FA₃** using starch as indicator

Repeat the titration until you obtain consistent values

Record your results in table 1 below

Results

(i) Mass of **S** usedg (0½mark)

(ii) Volume of pipette usedcm³ (0½mark)

Table 1

Final Burette reading (cm³)			
Initial Burette reading (cm³)			
Volume of FA₃ used (cm³)			

(04½marks)

(iii) Average volume of **FA₃** used (02½marks)

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Questions

(a) Calculate the;

(i) molarity of FA_1 ($K = 39$, $I = 127$, $O = 16$)

(03marks)

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(ii) molarity of FA_3

(05marks)

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(b) Determining the atomic mass of **M** in **MCr₂O₇**

Pipette **20** Or **25cm³** of **FA₂** into a clean conical flask, add **20cm³** of **1M** sulphuric acid followed by **10cm³** of **10%** potassium iodide solution.

Titrate the mixture with **FA₃** until the solution is pale yellow.

Add 5 drops of starch indicator and continue to titrate until the blue colour turns green

Repeat the titration until you obtain consistent values

Record your results in table 2 below

(i) Volume of pipette usedcm³ (0½mark)

Table 2

Final Burette reading (cm³)			
Initial Burette reading (cm³)			
Volume of FA₃ used (cm³)			

(04½marks)

(ii) Average volume of **FA₃** used (02½marks)

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Questions

(a) Calculate the number of moles of

(i) **FA₃** that reacted (02marks)

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(ii) iodine liberated by 20 or 25cm³ of **FA₂**

(02marks)

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(b) Determine the;

(i) molarity of **FA₂**

(02marks)

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(ii) value of **M** in **MCr₂O₇**

(03marks)

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2. You are provided with substance **T**, which contains two cations and two anions. Carry the tests in table 3 below to identify the cations and anions in **T**. Identify any gas(es) evolved. Record your observations and deductions in the table.

Table 3

TEST	OBSERVATION	DEDUCTION
(a) Heat two spatula endfuls of T strongly in a dry test tube. Keep the residue for part (d)		
(b) To one spatula endful of T in a test tube, add copper turnings followed by 5 drops of concentrated sulphuric acid and heat the mixture		
(c) Dissolve two spatula endfuls of T in about 6cm ³ of water and divide the resultant solution into four portions		
(i) To the first portion of the solution, add equal amount of ethanol followed by 2 – 3 drops of concentrated sulphuric acid and heat. Pour the mixture into a beaker of water		
(ii) To the second portion of the solution, add sodium hydroxide solution dropwise until in excess		

(iii) To the third portion of the solution, add 3 – 4 drops of dilute hydrochloric acid. Boil the mixture and cool		
(iv) Use the fourth portion to carry out a test of your own to test for one of the cations in T		
(d) To the residue from (a), add about 5cm ³ of dilute sulphuric acid and warm. Filter and divide the filtrate into two parts		
(i) To the first part of the filtrate, add sodium hydroxide solution dropwise until in excess		
(ii) To the second part of the filtrate, add solid ammonium chloride and shake to dissolve. Add 2 - 3 drops of disodium hydrogen phosphate solution followed by ammonia solution dropwise until in excess		

(e) Identify the;

(i) Cations in **T**

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(ii) Anions in **T**

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3. You are provided with an organic compound **V**. you are required to carry out tests in table 4 below on **V** and describe the nature of **V**. Record your observations and deductions in table. (17marks)

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a small amount of V on a spatula end or in a dry porcelain dish		
(b) To about 1cm ³ of V , add water, shake and test the mixture with litmus paper		
(c) To about 1cm ³ of V , add 2 – 3 drops of neutral Iron(III) chloride solution		
(d) To about 1cm ³ of V , add 3 – 4 drops of 2,4 – dinitro – phenylhydrazine		
(e) To about 2cm ³ of V , add 3 – 4 drops of acidified potassium dichromate(VI) solution and heat		
(f) To about 2cm ³ of V , add 2 – 3 drops of Luca's reagent		

(g) Describe the nature of **V**

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END