

NAME:		INDEX NO:	
SCHOOL:		SIGNATURE:	

P525/3
CHEMISTRY
(PRACTICAL)
Paper3
August, 2019
3 ¼ hrs



UNNASE MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

CHEMISTRY PRACTICAL

PAPER 3

3HOURS 15MINUTES

INSTRUCTION TO CANDIDATES:

- Answer **all** questions.
- Record your answers on this paper in the **spaces provided**.
- Mathematical tables, slide rulers 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 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

K=39,O=16,S=32,N=14,Fe=56,I=127

For examiners use only			
Q.1	Q.2	Q.3	TOTAL

1. You are provided with the following

FA1: which is approximately 0.02M potassium manganate (VII) solution.

FA2: which is a solution containing 5.2gdm^{-3} of a metal persulphate, molecular mass = 270.

FA3: which is a solution of 2.0M sulphuric acid

Solid L: which is diammoniumiron(II) sulphate $(\text{NH}_4)_2\text{SO}_4\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$

You are required to standardize FA1, and use it to determine the mole ratio for the reaction between aqueous iron(II) ions and the persulphate ions.

THEORY

In this reaction persulphate ions are reacted with excess iron (II) ions and the unreacted iron(II) ions titrated with acidified manganate(VII) ions.

PROCEDURE A

- (a) Weigh accurately about 6.0g of **L**. Dissolve it in 150cm^3 of **FA3** and transfer the solution into a 250cm^3 volumetric flask.
Make the solution up to the mark with distilled water and Label it **FA4**.
Pipette 25cm^3 (or 20cm^3) of **FA4** into a conical flask and titrate with **FA1** from the burette.
Repeat the titration until you obtain consistent results
- (i) Record your results in the table below

Results

Mass of weighing container + solid **L**..... (g) ($\frac{1}{2}$ mark)

Mass of weighing container alone = (g) ($\frac{1}{2}$ mark)

Mass of solid **L**= (g) ($\frac{1}{2}$ mark)

Volume of pipette used = (cm^3) ($\frac{1}{2}$ mark)

TABLE I

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

($4\frac{1}{2}$ marks)

(ii) Volumes of **FA1 to be** used to calculate average volume =
.....and(cm^3) ($\frac{1}{2}$ mark)

(iii) Calculate the average volume of **FA1**
..... (cm^3) ($2\frac{1}{2}$ marks)

Questions

(a) Calculate the molar concentration of iron (II) ions in **FA4**. ($2\frac{1}{2}$ marks)

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(b) Determine the concentration of **FA1** in mol dm^{-3} . (4 marks)

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PROCEDURE B

- (b) Pipette 25cm³(or 20 cm³) of **FA4** into a conical flask and add 10cm³ of **FA2**. Titrate the mixture with **FA1** from the burette.

Repeat the titration until you obtain consistent results

- (i) Record your results in the table below

Results:

Volumes of pipette used = (cm³)($\frac{1}{2}$ mark)

Table II

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

(4 $\frac{1}{2}$ marks)

- (ii) Volumes of **FA1 to be** used to calculate average volume =

.....and(cm³)($\frac{1}{2}$ mark)

- (iii) Calculate the average volume of **FA1**

.....(cm³)(2 $\frac{1}{2}$ marks)

Questions:

- b) Calculate the number of moles of:

- (i) un-reacted iron(II) ions that reacted with the manganate (VII) ions in FA1
(2marks)

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ii) iron(II) ions that reacted with persulphate ions.

$(1\frac{1}{2}\text{marks})$

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c) Determine the:

(i) number of moles of metal persulphate that reacted.

$(1\frac{1}{2}\text{marks})$

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(ii) reaction mole ratio between metal persulphate and iron(II) ions. (1mark)

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2. You are provided with substance **Q** which contains **three** cations and **one** anion. Carry out the following tests to identify the cations and anion in **Q**. Record your observations and deductions in the table below. Where a gas(es) is /are evolved must be identified. (30marks)

TESTS	OBSERVATIONS	DEDUCTIONS
(a) To one spatula endful of Q add 5 drops of concentrated sulphuric acid and heat.		
(b) To two spatula endfuls of Q in the test tube add about 10cm ³ of water and shake strongly, warm and then filter. Keep both the filtrate and residue. Divide the filtrate into six parts.		
(i) To the first part add dilute sodium solution hydroxide drop-wise until in excess.		
(ii) To the second part add aqueous ammonia solution drop-wise until in excess.		
(iii) To the third part add 0.5cm ³ of ammonium oxalate solution followed by dilute ethanoic acid.		

<p>(iv) Use the fourth part to carry out a test of your own to confirm the cation in the filtrate.</p> <p>Test:</p>		
<p>(v) To the fifth part add about 1cm³ of dilute sodium hydroxide solution followed by half spatula of zinc powder and heat</p>		
<p>(vi) To the sixth part add half spatula of copper turnings followed by 5 drops of concentrated sulphuric acid and heat.</p>		
<p>c) Wash the residue with water then dissolve it in about 10cm³ of dilute nitric acid. To half of the resultant solution in a boiling tube add dilute sodium hydroxide solution drop-wise until no further change. Then filter and keep both the filtrate and residue.</p>		
<p>d) To the filtrate add dilute nitric acid to acidify the solution. Divide the resultant solution into three portions.</p>		

(i) To the first portion of acidified solution add dilute sodium hydroxide solution drop-wise until in excess.		
(ii) To the second portion of acidified solution add aqueous ammonia solution drop-wise until in excess.		
(ii) To the third portion of acidified solution add 2-3 drops potassium iodide solution followed by dilute sodium hydroxide solution.		
(e) Dissolve the residue in part (c) in minimum dilute nitric acid and divide the solution into four parts		
(i) To the first part add aqueous sodium hydroxide solution drop-wise until in excess.		
(ii) To the second part add aqueous ammonia solution drop-wise until in excess.		

(iii) To the third part add 2-3 drops ammonium oxalate solution.		
(iv) To the fourth part add half spatula end-ful of ammonium chloride followed by about 1 cm ³ of concentrated solution of disodium hydrogen phosphate then ammonia solution drop-wise until in excess.		

f) Identify the cations and anion in **Q**.

Cations:

Anion:

3. You are provided with substance **T** which is an organic compound. You are required to determine the nature of **T**. Carry out the following tests on **T** and record your observations and deductions in the table below.

(20marks)

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a small amount of T on a spatula end or in a porcelain dish.		
(b) Shake 0.5cm ³ of T with about 1cm ³ of water and then test the solution with litmus paper		
c) To about 0.5cm ³ of T add drops of iron(III) chloride solution		
d) To about 0.5cm ³ of T add few drops bromine water and shake		

e) To about 0.5cm ³ of T add drops of acidified potassium dichromate (VI) solution and heat		
f) To about 0.5cm ³ of T add Lucas reagent.		
g) To about 0.5cm ³ of T add drops of 2,4-dinitrophenyl hydrazine solution.		
g) Dissolve about 0.5cm ³ of T in about 1cm ³ of methanol. To the resultant solution add iodine solution followed by dilute sodium hydroxide solution drop-wise until the brown solution of iodine is just discharged. Heat and cool then allow to cool.		

h) To about 0.5cm ³ of T add 5 drops of concentrated sulphuric acid followed by concentrated solution of sodium hydrogen sulphite and shake strongly		
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(i) Comment on the nature of **T**.

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