Name ……..……**Index No**…….....

Signature …….

P525/3

Chemistry

Paper 3

3 ¼ Hrs

UACE PRE MOCK EXAMS 2019

CHEMISTRY

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 non-programmable calculators may be used.*
- *Reference books should not be used.*
- *Where necessary use: (C =12, O=16, H=1)*

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

1. You are provided with the following:

FA1, which is sodium hydroxide solution

FA2, which is 0.2M sulphuric acid

Solid R, an organic acid, $\mathbf{(CH_3)_y(COOH)_2}$

You are required to determine the value of y

Theory

When excess sodium hydroxide is added to solid R, all the solid reacts and the unreacted alkali can be determined by titration with standard sulphuric acid.

R reacts with sodium hydroxide according to the equation;

$$\mathbf{(CH_3)_y(COOH)_2(aq) + 2NaOH(aq) \longrightarrow (CH_3)_y(COONa)_2(aq) + 2H_2O(l)}$$

Part I

Pipette 10cm^3 of FA1 into a conical flask. Add 1 drop of phenolphthalein indicator and titrate with FA2. Repeat the titration to obtain consistent titre values. Record your results in the table below.

Results

Volume of pipette ……..cm^3

Final burette reading(cm^3)			
Initial burette reading(cm^3)			
Volume of FA2 used(cm^3)			

Titre values for calculating average volume of FA2

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Average volume of FA2

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Question

Determine the molarity of FA1

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Part II

Weigh accurately 1.0g of R in a beaker and add 100cm^3 of FA1. Stir the mixture until R dissolves completely. Transfer the solution into a 250cm^3 volumetric flask and make it to the mark with distilled water. Then label FA3.

Pipette 25 or 20cm^3 of FA3 into a conical flask, add 2-3 drops of phenolphthalein indicator. Titrate the solution with FA2. Repeat the titration to obtain consistent titre values. Record your results in the table below.

Results

Mass of weighing vessel + P …….g

Mass of weighing vessel alone ……..g

Mass of P weighed ……..g

Volume of pipette used ……..cm^3

Titration number	1	2	3
Final burette reading(cm^3)			
Initial burette reading(cm^3)			
Volume of FA2 used(cm^3)			

Titre values for calculating average volume of FA2

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Average volume of FA2

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Questions

(a) Calculate the number of moles of:

(i) Sulphuric acid (FA2) that reacted with excess sodium hydroxide in FA3

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(ii) Excess sodium hydroxide in 250cm^3 of FA3

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(iii) Sodium hydroxide that reacted with solid R

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(iv) Solid R that reacted with sodium hydroxide

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(b) Hence determine the value of **y**

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2. You are provided with substance **W**, which contains two cations and two anions. Carry out the tests below to identify the ions. Identify any gases that may be produced. Record your observations and deductions in the table below.

Tests	Observations	Deductions
(a) Heat a spatula endful of **W** in a test tube until there is no further change.		
(b) To two spatula endful of W in another test tube, add about $8cm^3$ of distilled water and shake well. then filter. Keep both filtrate and residue.		
Divide the filtrate into 8 portions (i) To the first portion, add 2-3 drops of lead (II) nitrate solution followed by dilute nitric acid.		
(ii) To the second portion, add 3-4 drops of silver nitrate solution followed by excess ammonia solution.		

(iii)	To the third portion, add few pieces of copper turnings and 3-4 drops of concentrated sulphuric acid. Then heat gently.		
(iv)	Use the fourth portion to confirm the anion suspected in (iii) above.		
(v)	To the fifth portion, add sodium hydroxide solution dropwise until in excess.		
(vi)	To the sixth portion, add ammonia solution drop wise until in excess.		
(vii)	To the seventh portion, add 3-4 drops of dilute sulphuric acid.		
(viii)	Use the eighth portion to confirm the cation in the filtrate.		

(c) Wash the residue and transfer it into a test tube. Add about $5cm^3$ of dilute nitric acid and warm gently. Divide the solution into three portions.		
(i) To the first portion, add sodium hydroxide solution dropwise until in excess.		
(ii) To the second portion, add ammonia solution dropwise until in excess.		
(iii) To the third portion, add 3-4 drops of potassium hexacyanoferrate (II) solution.		

(d) Identify;

(i) The cations in **W** …….....and……..

(ii) The anions in **W** ……and…….…….

3. You are provided with substance **S**, which is organic. Carry out the tests below to identify the nature of S. Record your tests and observations in the table below.

Tests	Observations	Deductions
(a) Burn a small amount of S on a spatula end		
(b) To 5cm^3 of S, add an equal volume of water. Shake and test with litmus. Divide the solution into portions.		
(i) To the first portion, add 2-3 drops of neutral iron (III) chloride solution.		
(ii) To the second portion, add little solid sodium carbonate.		
(iii) To the third portion, add 2-3 drops of acidified potassium dichromate and warm.		

(iv) To the fourth portion, add 3-4 drops of Luca's reagent.		
(v) To the fifth portion, add 3-4 drops of Brady's reagent.		
(c) To 1cm^3 of S, add a few drops of distilled water followed by 5cm^3 of iodine solution. Add sodium hydroxide in drops until the brown colour of iodine is discharged. Then warm and cool.		

(d) Comment on the nature of S.

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END