Name…… …….… adm No:…….

233/3 Candidate's Signature…….……

CHEMISTRY Date: ……

Paper 3

(Practical)

TERM TWO

Time: 2 ¼ Hours

FORM THREE

INSTRUCTIONS TO CANDIDATES

- Write your **name** and **admission number** in the spaces provided.
- **Sign** and write the **date** of examination in the spaces provided.
- Answer ***all*** the questions in the spaces provided in the question paper.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus you need.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

For examiners use only

Question	Maximum Score	Candidate's Score
1		
2		
TOTAL	40	

This paper consists of 5 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. **You are provided with;**

- Solution C which is solution of dibasic acid $(COOH)_2$ XH_2O containing 10.08g per litre of solution.
- Solution D which is 0.2M solution of sodium hydroxide.

You are required to determine the value of X in the formula $(COOH)_2.XH_2O$

(H= 1, C = 12, O = 16)

Procedure

- Fill the burette to the mark with solution C.
- Pipette 25.0cm^3 of solution D into a clean conical flask
- Add two drops of phenolphthalein indicator and titrate with solution C.
- Repeat the titration to obtain consistent results and record your results in table 1 below.

TABLE I 4mks

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of acid used (cm^3)			

a) Calculate the average volume of solution C used. (1mark)

.....

.....

.....

b) Calculate the number of moles of D used. (2marks)

.....

.....

.....

c) Calculate the number of moles of C used given that the reacting ratio of acid to base is 1:2 (2marks)

.....

.....

.....

d) Calculate the concentration of acid solution C in moles per litre. (2marks)

.....

.....

.....

e) Calculate the relative formula mass of the acid $(COOH)_2 X H_2O$. (2marks)

.....

.....

.....

f) Hence, determine the value of X in $(COOH)_2 X H_2O$. (2marks)

.....

.....

.....

2. You are required to determine the enthalpy of displacement of $Cu^{2+}_{(aq)}$ by Zinc.

Procedure

i) Wrap the plastic beaker that has been provided with a tissue paper.

ii) Place $50cm^3$ of 0.2M Copper (II) Sulphate solution in the beaker. Dip the thermometer in the solution and note the steady temperature of the solution.

iii) Carefully transfer all the 1.0g of Zinc powder provided into the plastic beaker and stir carefully with the thermometer.

iv) Record the highest temperature that the solution attain.

Record the results in the Table II below. **Table II.**

Volume of Copper (II) Sulphate solution used (cm^3)	
Highest temperature of the mixture (^0C)	
Initial temperature of Copper (II) Sulphate Solution (^0C)	
Change in temperature (^0C)	

(2marks)

Specific heat capacity = $4.2kJKg^{-1}k^{-1}$

Density of the solution = $1g/cm^3$

a) Calculate the number of moles of Cu^{2+} ions that are in $50cm^3$ of the solution. (2marks)

.....

.....

.....

b) Calculate the amount of heat liberated in the reaction. (2marks)

.....

.....

c) Determine the enthalpy of displacement of Copper. (2marks)

.....

.....

.....

d) Explain why excess Zinc powder was added into the beaker. (1mark)

.....

.....

e) Write the ionic equation for the reaction that takes place. Indicate the enthalpy change for the reaction. (2marks)

.....

.....

3. You have been provided with solid Q. Perform the tests below and identify ions present in the sample.

i) Put all the solid Q in a boiling tube and then add $8cm^3$ of distilled water a little at a time while shaking. Divide the solution formed into five portions in test tubes.

Observation	Inference
(1mark)	(1mark)

ii) To the first portion add dilute sodium hydroxide dropwise until in excess.

Observation	Inference
(1mark)	(1mark)

iii) To the second portion add ammonia solution dropwise until in excess.

Observation	Inference
(1mark)	(1mark)

iv) To the third portion add dilute Hydrochloric acid and then warm.

Observation	Inference
(1mark)	(1mark)

v)To the fourth portion add 3 drops of Barium nitrate solution (NB keep the mixture for part (vi)

Observation	Inference
(1mark)	(1mark)

vi) Add $1cm^3$ of nitric (V) acid (HNO_3) to the mixture obtained in (v) above.

Observation	Inference
(1mark)	(1mark)

vii) To the fifth portion add 3 drop Lead (II) nitrate

Observation	Inference
(1mark)	(1mark)