**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**

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| --- | --- | --- |
| **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 XH2O 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. XH2O

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

 **Procedure**

 - Fill the burette to the mark with solution C.

 - Pipette 25.0cm3 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



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

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

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

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

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 e) Calculate the relative formula mass of the acid (COOH)2 X H2­O. (2marks)

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 f) Hence, determine the value of X in (COOH)2 X H2O. (2marks)

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2. You are required to determine the enthalpy of displacement of Cu2+(aq) by Zinc.

 **Procedure**

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

 ii) Place 50cm3 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.**



 (2marks)

 Specific heat capacity = 4.2kJKg-1k-1

 Density of the solution = 1g/cm3

 a) Calculate the number of moles of Cu2+ ions that are in 50cm3 of the solution. (2marks)

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

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

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

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

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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 8cm3 of distilled water a little at a time while shaking. Divide the solution formed into five portions in test tubes.



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



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



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

 

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

 

 vi) Add 1cm3 of nitric (V) acid (HNO3) to the mixture obtained in (v) above.

 

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

 