**NAME…………………………………………………………………………INDEX NO……………..**

**DATE……………………………………………………CANDIDATES SIGNATURE……………….**

**CHEMISTRY**

**233/3**

**PRACTICAL**

**2HRS 15MINS**

**3KNT ALLIANCE JOUNT EXAMINATIONS – 2017**

 **FORM FOUR**

 **INSTRUCTIONS TO CANDIDATES**

* Write your name and index number in the spaces provided above.
* 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 15minutes of 2 ¼ hrs allowed for this paper. This time is to enable you read the question paper and make sure you have all the chemicals and apparatus that you may 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** | **MAX. SCORE** | **CANDIDATES SCORE** |
| **1****2****3****TOTAL SCORE** | **20****14****6****40** |  |

1. Your are provided with;

* Solution C1 which is a solution of a dibasic acid H2C2O4XH2O containing 5.04g in 500cm3 of solution.
* Solution C2 which is a 0.2M solution of NaOH.

 You are required to:

 Determine the value of X in the formula H2C2O4XH2O ( H = 1, C = 12, O = 16)

 Procedure

- Fill the burrete with solution C1, Pipette 25cm3 of solution C2 into a clean dry conical flask. Add 2 drops of phenolphthalein indicator and titrate against C1 until the indicator just turns colourless.

- Repeat the procedure two more times and complete the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Titration** | **I** | **II** | **III** |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution C1 used (cm3) |  |  |  |

a) Calculate the average volume of C1 used. (1mk)

b) Calculate the moles of the acid C1 reacting. (3mks)

c) Calculate the concentration of the acid C1 in the moles/litre. (2mks)

d) Calculate the relative formula mass of the acid. (3mks)

e) Hence, determine the value of X in the H2C2O4XH2O. (2mks)

2. You are provided with:

 - 5g of solid K

 - Distilled water

 You are required to determine solubility of K at different temperatures.

 Procedure

- Transfer solid K into a boiling tube. Using a 10ml measuring cylinder, measure 10cm3 of H2O into the boiling tube. Heat the mixture while stirring with the thermometer to about 900c. When all the solid has dissolved, allow the solution to cool while stirring with the thermometer.

- Record the temperature at which the crystals of solid K first appears in the table below.

- Measure 5cm3 of distilled water and add to the mixture in the boiling tube. Heat until the crystals dissolves, then cool while stirring with a thermometer.

- Record this temperature at which the crystals again start to reappear.

- Repeat this procedure, each time adding more 5cm3 of distilled water heating, cooling and recording the crystallization temperature until the table is completely filled.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Total volume of water added 5g of solid K (cm3)** | **10** | **15** | **20** | **25** | **30** | **35** |
| **Temperature at which crystals appear (0C)** |  |  |  |  |  |  |
| **Solubility of K in g/100g of water** |  |  |  |  |  |  |

a) Complete the table and calculate the solubility of solid K in g/100g H2O at different temperature. (6mks)

b) On the grid plot a graph of solubility of solid K against temperature. (3mks)

c) From the graph determine;

i) The solubility of K at 250C. (1mk)

ii) The temperature when the solution will contain 22g of K. (1mk)

d) From your results, calculate the mass of K that will crystallize out when a hot solution at 520C is cooled to 370C. (1mk)

3. You are provided with solid F and P. carry out the test below. Write you observations and inferences in the spaces provided.

a) Using a clean spatula heat the solid F in a Bunsen burner flame.

 **Observations Inferences**

 (½ mk) (½ mk)

b) Place the remaining portion of solid F in a boiling tube. Add about 10cm3 distilled water. Stir and filter. Keep the residue for further tests. Divide the filtrate into four portions.

i) To the first portion; add NaOH solution till in excess.

 **Observations Inferences**

 (1mk) (1mk)

ii) To the second portion, add NH4OH solution till in excess.

 **Observations Inferences**

(1mk) (1mk)

iii) To the third portion, add Pb(NO3)2 then warm.

 **Observations Inferences**

 (1mk) (½mk)

iv) To the fourth portion, add BaCl solution followed by HCl.

 **Observation Inferences**

 ( ½ mks) (½ mk)

c) Dissolve the residue into 5cm3 of 2M HCl and record observations and make inferences.

 **Observations Inferences**

 (½ mk) (½ mk)

d) Carry out the following tests of P.

i) Using a clean metallic spatula heat solid P in a Bunsen burner flame.

 **Observations Inferences**

 ( ½ mk) ( ½mk)

ii) Put two spatula-ful of P in a boiling tube. Add 10cm3 of distilled water. Warm the mixture to dissolve and divide the solution into 3 portions.

i) To the first portion, add NaHCO3

 **Observations Inferences**

 ( ½mk) ( ½mk)

ii) To the second portion add 3 drops of concentrated H2SO4. Shake well and add 1cm3 of Ethanol and warm the mixture.

 **Observations Inferences**

 ( ½ mk) ( ½mk)

iii) To the 3rd portion, add 1 – 2 drops of Acidified KmnO4 solution.

 **Observations Inferences**

 (1mk) (1mk)