**NAME ……………..………………………………………… Adm NO……........ Class…….**

**SCHOOL………………………………………………CANDIDATE’s SIGNATURE…….….**

**DATE………..…**

**CHEMISTRY233/3**

**(PRACICAL)**

**PAPER 3**

**MARCH 2019**

**TIME: 2¼ HOURS**

**MOMALICHE 2 CYCLE 6 MARCH 2019**

**Kenya Certificate of Secondary Education**

**INSTRUCTIONS TO CANDIDATES:**

(a) Write your **name** and **number** in the spaces provided **above**.

(b) **Sign** and write the **date** of examination in the spaces provided **above**.

(c) Answer **ALL** the questions in the spaces provided.

(d) Mathematics tables and electronic calculators may be used.

(e) All working must be clearly shown where necessary.

(f) The first 15 minutes should be used to go through the questions.

**FOR EXAMINER’S USE ONLY:**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum**  **Score** | **Candidate’s**  **Score** |
| **1** | **24** |  |
| **2** | **16** |  |
| **Total Score** | **40** |  |

*Chemistry Paper 3 Turnover*

*This paper consists of 6 printed pages, confirm.*

1. You are provided with;

- 3.6g of solid **P** which is a hydrated acid with formula H2C2O4.nH2O

- Solution **X**, a 0.2M sodium hydroxide solution.

You are required to determine:

1. Solubility of solid **P**
2. The value of n in the formula H2C2O4.nH2O

**Procedure 1**

1. Fill the burette with distilled water
2. Place solid **P** in the boiling tube.
3. Transfer 4cm3 of distilled water from the burette into the boiling tube containing solid **P**.
4. Heat the mixture while stirring with the thermometer to a temperature of 80˚C.
5. Allow the solution to cool while stirring with a thermometer.
6. Record the temperature at which the crystals start to form in the table below
7. Add a further 2cm3 of distilled water from the burette to the mixture

Repeat procedure (iv) and (v) above and record the crystallization temperature. Complete the table below by adding the volumes of distilled water as indicated. (**PRESERVE THE CONTENTS**)

|  |  |  |
| --- | --- | --- |
| Volume of distilled water (ml) | Crystallization temperature (0C) | Solubility of solid P in g/100g of water |
| 4 |  |  |
| 6 |  |  |
| 8 |  |  |
| 10 |  |  |
| 12 |  |  |

(6mks)

On the grid provided, plot a graph of solubility of solid **P** (y – axis) against crystallization temperature. (3mks)



From the graph, determine;

1. The solubility of solid **P** at 60˚C (1 mk)
2. The temperature at which 40g of **P**dissolves in 50g of water (1 mk)

**Procedure II**

1. Transfer the contents of the boiling tube in procedure I to a clean 250ml volumetric flask.
2. Rinse the boiling tube with distilled water and add this rinse water to content of the volumetric flask.
3. Add distilled water to the mark
4. Label the resulting solution as **Q**
5. Fill the burette with solution **Q**
6. Pipette 25cm3 of solution **X** into a clean conical flask. Add three drops of phenolphthalein indicator
7. Titrate **Q** against **X** to an accurate end point.

Record your results in table II below.

Repeat this procedure twice to get concordant results.

**Table II**

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading in cm3 |  |  |  |
| Initial burette reading in cm3 |  |  |  |
| Volume of solution Q used in cm3 |  |  |  |

(4mks)

**Calculate**;

1. Average volume of **Q** used (1 mk)

b)i) Moles of solution **X** used (2 mk)

b(ii) Moles of solution **Q** used (2mk)

1. Moles of solution Q in 250 ml solution prepared from the boiling tube content at the start of **procedure II** above. (1 mk)
2. The RFM of solid **P.** (1mk)

c) Determine the value of **n** in the formula H2C2O4.nH2O (2mks)

1. You are provided with solid **M**, solution **W**and soap solution.
2. Place 100ml of distilled water into a clean 250ml beaker. Add all the solid **M** into the water and stir thoroughly.
3. Label this as **solution M**.

|  |  |
| --- | --- |
| Observation | I.nferences |
| (1mk) | (1mk) |

1. i) Place **1ml** of solution **M** into a 250 ml conical flask and add 25ml distilled water to it.

ii)Place the given soap solution into a clean burette and after a minute note the starting volume. Run rapid drops of soap solution into the diluted solution **M** whilst shaking thoroughly todetermine how much soap solution will give you permanent lather (lather to last for more than 3 minutes).

Repeat step (ii) using **26 ml** of solution **W**

|  |  |  |
| --- | --- | --- |
|  | Volume of soap solution to produce lather | Inferences |
| Dilute solution**M** | 1mk | 1mk |
| solution**W** | 1mk | 1mk |

iii) What other observation is made in the conical flask containing M and soap? 1mk

ii)Place 2 ml of solution M, into a clean conical flask and dilute it with 25ml of distilled water.Heat gently to just boil for half a minute. Let it cool under a running tap. Add to the cooled solution soap solution as in (i) above and record the volume of soap that will produce a permanent lather.

|  |  |  |
| --- | --- | --- |
|  | Volume of soap solution to produce lather | Inferences |
| Dilute boiled solution **M** | 1mk | 1mk |

Into 3 clean test tubes, place about 2ml of the remaining solution **M**

1. To the first portion add NaOH(aq) dropwise till in excess.

|  |  |
| --- | --- |
| Observation | Inferences |
| 1mk | 1mk |

1. To the second portion, add 3 drops of Na2SO4 solution

|  |  |
| --- | --- |
| Observation | Inferences |
| 1mk | 1mk |

1. To the third portion add three drops of Ba(NO3)2(aq)

|  |  |
| --- | --- |
| Observation | Inferences |
| 1mk | 1mk |

1. To the mixture in (III) above add 3 drops of dilute HNO3(aq) and shake.

|  |  |
| --- | --- |
| Observation | Inferences |
| 1mk | 1mk |

**THE END**

**MOMALICHE 2 CYCLE 6**

**CONFIDENTIAL INSTRUCTIONS FOR CHEMISTRY PAPER 3**

**Requirements per candidate**

* + - 1. 250cm3Volumetric flask
      2. 10cm3 measuring cylinder
      3. 2 conical flasks
      4. Labels about 2
      5. Thermometer - -10 to 110 0C
      6. Complete retort stand
      7. Filter funnel
      8. 0.2M NaOH – 100cm3 solution X
      9. Pipette
      10. Burette
      11. Exactly 3.6g of solid P
      12. 50ml of solution **W** in beaker. W is distilled water
      13. Solid M- 0.1g in container
      14. Distilled water (500ml)
      15. One boiling tube and four test tubes per candidate
      16. 60 cm3 of soap solution

Notes for preparation

1. Solid P is ethandioic acid dehydrate H2C2O4.H2O
2. Solid M is magnesium sulphate
3. Solution X is 0.2 M sodium hydroxide
4. Soap solution 5g of solid soap dissolved in 1 litre of water, best soap brands are Menengai, Kwanga, Panga……

**Access to:**

* + - 1. 2M NaOH solution
      2. 2M Ba(NO3)2 solution
      3. 2 Na2SO4 solution
      4. Source of flame/heat
      5. Phenolphthalein indicator
      6. 2M HNO3 solution