**Name: .................................................................................Candidate’s signature………………**

**Index number……………………………………… Date……………**

**233/3**

**CHEMISTRY**

**PRACTICAL**

**Paper 3**

**Time: 2HRS 15MINS**

**FORM 4 END TERM II-EXAMINATIONS**

**Kenya Certificate of Secondary Education**

**Paper 3**

**Instructions to candidates**

1. Write your name and index number in the spaces provided here
2. Sign and write the date of examination in the spaces provided above
3. Answer ALL questions in the spaces provided in the question paper
4. KNEC Mathematical tables and silent non – programmable electronic calculators may be used.
5. All working MUST be clearly shown where necessary.
6. This paper consists of 6 printed pages
7. **Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing**
8. **Candidates should answer the questions in English.**

|  |  |  |
| --- | --- | --- |
| **Question** | **Total Marks** | **Candidates score** |
| **Q1** | **12** |  |
| **Q2** | **07** |  |
| **Q3** | **13** |  |
| **Q4** | **08** |  |
|  | **TOTAL SCORE** |  |

1. You are provided with:

* Solution C1 which is a solution of a dibasic acid, H2C2O4.XH2O containing 5.04g in 500cm3 of solution.
* Solution C2 which is a 0.2M solution of sodium hydroxide.

You are required to determine the value of X in the formula H2C2O4.XH2O. (H=1.0;C=12.0;O=16.0).

**Procedure:**

Fill the burette to the mark with solution C1. Pipette 25.0cm3 of C2 into a clean dry conical flask.Titrate C1 against C2 using phenolphthalein as indicator. Repeat the titration to obtain consistent results. Enter your results in the table below. (4mks

|  |  |  |  |
| --- | --- | --- | --- |
| Titration Number | 1 | 2 | 3 |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of acid used (cm3) |  |  |  |

1. Calculate the average volume C1 used. (1mark)

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1. Calculate the concentration of the acid in moles per litre. (3marks)

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1. Calculate the relative formula mass of the acid. (2marks) ------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
2. Hence determine the value of X in the acid H2C2O4.XH2O. (2marks)

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1. You are provided with:

* 2cm Magnesium ribbon Solid A.
* About 60cm3 Solution B (0.7M hydrochloric acid)

You are required to determine the:

* Temperature change when magnesium reacts with excess hydrochloric acid.
* Molar heat of reaction between Magnesium and hydrochloric acid.

**Procedure:**

Using a burette, measure 50cm3 of Solution B and place in a 100ml beaker. Measure the temperature of Solution B in the 100ml beaker and record the value in table II below. Put the magnesium ribbon in the 50cm3 of Solution B in the 100ml beaker and immediately start the stop watch. Stir the mixture continuously with the thermometer making sure the magnesium ribbon remains inside the solution as it reacts. Measure the temperature after every 30seconds and record in the values in the table below. Continue stirring and measuring the temperature to complete the table.

1. Table II ( 5mks)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (Sec) | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 |
| Temperature (®C) |  |  |  |  |  |  |  |  |  |  |  |

1. i) Plot a graph of temperature (Y-Axis) against time. (3marks)

ii) On the graph, show the maximum change in temperature, ∆T and determine its value. (1mark)

1. Determine the molar heat of reaction between magnesium and hydrochloric acid. (Assume the heat capacity of the solution is 4.2j/g/k and density is 1.0g/cm3. (3marks)

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1. You are provided with solid E. Carry out the following tests on E and record your observations and inferences in the tables provided.
2. Put solid E in a boiling tube. Add distilled water to half the tube. Shake the mixture.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

1. i) To about 1cm3 of solution formed, add sodium hydroxide drop wise until in excess.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

ii) To about 1cm3 of the solution above, add ammonia solution drop wise until in excess.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

iii) To about 1cm3 of the solution above, add universal indicator.

|  |  |
| --- | --- |
| Observations (1/2mark) | Inferences (1/2mark) |
|  |  |

iv) To about 1cm3 of the solution above, add 3 drops of dilute nitric (iv) acid.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

v) To about 1cm3 of the solution above, add Lead (II) nitrate solution and boil the mixture

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

vi) To about 1cm3 of the solution, add barium chloride solution.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

1. You are provided with solid F. Carry out the tests below and record your observations and inferences in the spaces provided.
2. Place half of Solid F in a boiling tube. Add about 8cm3 of absolute ethanol and shake.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

1. Place about 2cm3 of obtained in a test tube. Add universal indicator solution and test its PH.

|  |  |
| --- | --- |
| Observations (1/2mark) | Inferences (1/2mark) |
|  |  |

1. Place about 2cm3 of obtained in a test tube. Add Acidified Potassium dichromate (vi).

|  |  |
| --- | --- |
| Observations (1mark) | Inferences (1mark) |
|  |  |

1. Place about 2cm3 of obtained in a test tube and add half of the Sodium hydrogen carbonate provided.

|  |  |
| --- | --- |
| Observations (1/2mark) | Inferences (1/2mark) |
|  |  |

1. Place the other half of Solid F in a boiling tube. Add 8cm3 of distilled water and shake.

(I] Place about 2cm3 of obtained in a test tube. Add Sodium Hydrogen Carbonate that remained.

|  |  |
| --- | --- |
| Observations (1/2mark) | Inferences (1/2mark) |
|  |  |

(II]Place about 2cm3 of obtained in a test tube. Add Universal Indicator solution and test its PH.

|  |  |
| --- | --- |
| Observations (1/2mark) | Inferences (1/2mark) |
|  |  |