**Name…………………………..Index No……………………….ADM……….............................**

**School……………………………………Date……………………………………………………**

**Class………………………………….**

233/3

Chemistry

**PAPER 3**

PRACTICAL

DECEMBER 2021

**Time: 21/4 Hours**

**MOKASA II EXAMINATION**

**Kenya Certificate of Secondary Education (K.C.S.E)**

**INSTRUCTIONS TO CANDIDATES**

* Write your name and index 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 21/4 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 required
* **All** working **must** be clearly shown where necessary
* Mathematical tables and electronic calculators may be used
* This paper has **8** printed pages. Check to confirm that it is so.

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **Max Score** | **Candidate Score** |
| **1** | **33** |  |
| **2** | **11** |  |
| **3** | **06** |  |
| **TOTAL** | **40** |  |

1. You are provided with:
2. Solution B, containing 2MHCl
3. Solid A, Magnesium ribbon
4. Solution D, containing 0.2M NaOH
5. Solution X, containing 0.15M Sodium thiosulphate

You are required to: determine

1. Molar heat of reaction between Magnesium and Hydrochloric acid
2. Rate of reaction between Hydrochloric and Sodium thiosulphate

**PROCEDURE I**

1. Place 20cm3 of solution B into 50ml plastic beaker and measure the initial temperature of solution B

**Initial temperature of solution B OC** (1/2mk)

1. Add **all** the Solid A provided to solution B and stir the mixture with a thermometer, measure the maximum temperature of solution.

**Maximum temperature of the solution OC** (1/2mk)

1. Transfer the resulting solution formed into a 250ml volumetric flask, add distilled water upto the mark, shake the mixture well and label it as **solution C**
2. Fill the burette with solution C upto 0.0mark, pipette 25cm3 of solution D into a clean conical flask and add 2-3 drops of phenolphthalein indicator.
3. Titrate the two solutions until the pink colour turns colourless. Repeat the titration two more times and record the values in table I below
4. **Table I** (4mks)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  I |  II |  III |
| Final burette reading |  |  |  |
| Initial burette reading |  |  |  |
| Volume of C used (cm3) |  |  |  |

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

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1. Calculate the number of moles of NaOH, Solution D used (1mk)

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1. Calculate the number of moles of Hydrochloric acid:
2. In the average volume of solution C used (1mk)

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1. In 250cm3 of solution C (1mk)

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1. In original, 20cm3 of solution B (1mk)

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1. That reacted with solid A, Magnesium (1mk)

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1. Determine the molar heat of reaction between Hydrochloric acid, solution B and solid A, Magnesium (4.2Jg-1K-1, Density =1g/cm3) (2mks)

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**PROCEDURE II**

1. Measure 30cm3 of solution X and transfer into a clean conical flask
2. Place the conical flask containing solution to a white piece of paper marked **X**
3. Add 10cm3 of solution B to the content of the conical flask swirl the flask and immediately start a stop watch, record the time taken for the mark X, to be invisible from above. Record the value in the **table II** below.
4. Repeat the procedure (iii) above using the volumes of solution X and distilled water indicated in **table II** below
5. **Table II**  (6mks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Experiment | Volume of solution X (cm3) | Volume of water (cm3) | Time (seconds) | 1/Time ( Sec-1) |
| 1 | 30 | 0 |   |  |
| 2 | 25 | 5 |  |  |
| 3 | 20 | 10 |  |  |
| 4 | 15 | 15 |  |  |
| 5 | 10 | 20 |  |  |

NB: Calculate the valuesRate, 1/Time to **3 decimals** and record in **table II** above

1. Plot a graph of rate, 1/Time (sec-1) against volume of solution X (Horizontal axis) (3mks)



1. From the graph, determine the time taken for mark X to be invisible when 18cm3 of water is used (1mk)

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1. You are provided with solid K, which is a mixture of two salts, carry out the following tests on solid K and record observations and inferences in the spaces provided

Place all the solid K in a boiling tube and about 10cm3 of water and shake well, filter the content of the boiling tube into a clean test tube, keep theRESIDUE and FILTRATE for tests below.

1. To about 2cm3 of filtrate and add about 2M Sodium hydroxide until in excess

|  |  |
| --- | --- |
| Observation (1mk) | Inference (1mk) |
|  |  |

1. Dip glass rod into about 2cm3 of the filtrate and place it in a Non-luminous flame

|  |  |
| --- | --- |
| Observation (1mk) | Inference (1mk) |
|  |  |

1. To about 2 cm3 offiltrate add about five drops of hydrochloric acid, followed by 3 drops of Barium Chloride solution

|  |  |
| --- | --- |
| Observation (1/2mk) | Inference (1/2mk) |
|  |  |

1. Dry the residue between filter paper, Place halfof it into a clean dry test tube and heat it strongly

|  |  |
| --- | --- |
| Observation (1mk) | Inference (1mk) |
|  |  |

1. i) Place the **r**emaining residue into another clean test tube and about 5cm3 of dilute Nitric (v) acid, shake the mixture and test any gases produced using a burning splint. Use the solution formed for tests below.

|  |  |
| --- | --- |
| Observation (1mk) | Inference (1mk) |
|  |  |

1. To about 1cm3 of the solution add 2M Sodium hydroxide drop wise until in excess.

|  |  |
| --- | --- |
| Observation (½mk) | Inference (½mk) |
|  |  |

1. To about 2cm3 of solution add 3 drops of Potassium Iodide solution.

|  |  |
| --- | --- |
| Observation (½ mark) | Inference (½ mark) |
|  |  |

1. You are provided with solution Z in a test tube , use it to carry the tests below and record observations and inferences in the spaces provided.

Divide the solution into four portions.

1. To the 1st portion, add 2cm3 of water and let the mixture to stand for a minute.

|  |  |
| --- | --- |
| Observation (1/2mk) | Inference (1/2mk) |
|  |  |

1. To the 2nd portion, add all the sodium Hydrogen carbonate provided.

|  |  |
| --- | --- |
| Observation (1/2mk) | Inference (½mk) |
|  |  |

1. To the 3rd portion, add 3 drops of acidified Potassium Manganate VII and warm.

|  |  |
| --- | --- |
| Observation (1/2mk) | Inference (1/2mk) |
|  |  |

1. i) Solution Z is suspected to be an Alkanoic acid, describe a test that can be carried out to confirm presence of alkanoic acid using Ethanol and any other necessary reagent and condition provided on the bench.

|  |  |
| --- | --- |
| Test (1mk) | Expected observation (1mk) |
|  |  |

1. Carry out the test described in d(i) above.

|  |  |
| --- | --- |
| Observation (1/2mk) | Inference (1/2mk) |
|  |  |

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