**NAME ADMN NO CLASS**

**233/3**

**CHEMISTRY**

**PAPER 3**

**(PRACTICAL)**

**TERM TWO DECEMBER 2021**

**TIME: 2 Hours 15 Minutes( 2¼ Hours)**

**MURANG’A EXTRA COUNTY SCHOOLS EXAMINATION (MECS)**

**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** 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 2¼ 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 may need.

* Mathematical tables and silent electronic calculators may be used.
* All working must be clearly shown where necessary.
* This paper has **8** printed pages.

**For Examiner’s Use Only**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate's score** |
| 1 | 22 |  |
| 2 | 11 |  |
| 3 | 07 |  |
| **Total score** | **40** |  |

1. You are provided with :

* 2M hydrochloric acid, solution W
* 5 pieces of magnesium ribbon, each 2cm long
* 0.5M sodium carbonate, solution R

You are required to determine:

1. the rate of reaction between hydrochloric acid and magnesium
2. the mass of 2cm of magnesium ribbon

Procedure 1

1. Using a clean measuring cylinder, measure 60cm3 of 2M hydrochloric acid, solution W and place it into a clean conical flask. Take one piece of 2cm piece of magnesium ribbon provided and place it in the hydrochloric acid and immediately start the stopwatch.
2. Measure and record the time taken for the magnesium ribbon to react completely with hydrochloric acid in table 1 below.

**Retain the contents of conical flask 1 for use in procedure II. Label this solution P**

1. Repeat the procedure using 50cm3, with 10 cm3 of water , 40 cm3 and 20cm3 of water ,, 30cm3 and 20cm3 of water , portions of 2M hydrochloric acid adding distilled water to make up to 60cm3 of solution and complete the table below.

NOTE: Do not retain the contents of the conical flask in experiments 2, 3, 4 and 5. Table 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Experiment number | 1 | 2 | 3 | 4 | 5 |
| Volume of 2M hydrochloric acid(cm3) | 60 | 50 | 40 | 30 | 20 |
| Volume of water added | 0 | 10 | 20 | 30 | 40 |
| Time taken for ribbon to disappear (s) |  |  |  |  |  |
| 1/time (sec -1) |  |  |  |  |  |

(6mks)

1. Plot a graph 1/time (sec-1) against volume of 2M hydrochloric acid (3mks)
2. From your graph, determine the time taken for the ribbon to disappear when 36cm3 of 2M hydrochloric acid were used. (1mks)

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1. In terms of rate of reaction, explain the shape of your graph. (1 mks)

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Procedure II

1. Using a clean measuring cylinder measure 40cm3 of distilled water and add it to the contents of the conical flask retained in procedure I labeled solution P
2. Fill a burette with solution P. Pipette 25.0cm3of solution R 0.5M sodium carbonate and place it into a clean flask. Add 2-3 drops of methyl orange indicator to solution R. Titrate with solution P and record your results in table II below. Repeat the titration two more times and complete the table.

Table II

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Final volume(cm3) |  |  |  |
| Initial volume (cm3) |  |  |  |
| Final- initial volume (cm3) |  |  |  |

(4mks)

Calculate the :

1. Average volume of solution P used. (1 mks)

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1. Number of moles of sodium carbonate solution R used. (1 mks)

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1. Number of moles of hydrochloric acid used. (1 mks)

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1. Number of moles of hydrochloric acid present in 100cm3 of solution P. (1 mks)

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1. Number of moles of hydrochloric acid present in 60cm3 of solution W. (1 mks)

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1. Number of moles of hydrochloric acid that reacted with 2cm magnesium ribbon. (1 mks)

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1. Mass of magnesium present in 2cm ribbon. (Mg = 24.0) (1 mks)

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1. You are provided with solid K. Carry out the following tests below. Write your observations and inferences in the spaces provided.
2. Place about one half of solid K in a dry test tube. Heat gently then strongly. Test any gases produced with blue and red litmus papers

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

1. Place the remaining amount of solid K in a boiling tube. Add about 10cm3 of distilled water and shake the mixture.

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

1. Divide solution K above into four portions of 2cm3 each in separate test tubes. Use the portions for tests (i) to (iv) below.
2. To the first portion add sodium hydroxide solution dropwise until in excess.

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

1. To the second portion add about 1cm3 of sodium chloride solution

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

1. To the second portion add aqueous ammonia drop wise till excess

|  |  |
| --- | --- |
| observation | inference |
| (½mk) | (½mk) |

1. To the second portion add three drops of aqueous barium nitrate followed by five drops of nitric (v) acid .

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

3. You are provided with an organic substance S. Carry out the following tests and record your observations and inferences in the spaces provided.

a) Place about one third of substance S on a metallic spatula and ignite it with a bunsen burner flame.

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

Place the remaining amount of substance S in a boiling tube. Add about 10cm3 of distilled water and shake well. Use about 2cm3 portions of the mixture obtained for tests (i) to (iii) below.

1. To the first portion add solid sodium hydrogen carbonate.

|  |  |
| --- | --- |
| observation | inference |
| (½mk) | (½mk) |

1. To the second portion add two drops of acidified potassium manganite (VI) solution.

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

1. To the third portion add 3 drops of bromine water

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |