**Name ………………………………………………….…………………………………….**

**Index No…..………………………………………………………………………..…….….**

**School ……………………………………………Candidate’s Signature…….........…..….**

 **Date: ………………………………..**

233/3

**CHEMISTRY PRACTICALS**

Paper 3

December, 2021

**Time: 2¼ Hours**

 **MOMALICHE 4 CYCLE 8 JOINT EXAMINATION TESTS,**

 **DECEMBER, 2021**

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

**INSTRUCTION TO CANDIDATES**

* Write your name, school and index number in the spaces provided.
* Sign and write the date in the spaces provided.
* Answer **all** the questions in the spaces provided.
* **Mathematical tables** and **electronic calculators** may be used.
* **All** working must be clearly shown.

 **FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| Question | Maximum Score | Candidate’s Score |
| 123 | 21118 |  |
| **TOTAL** | **40** |  |

**QUESTION** **1**.

You are provided with:-

* Solid M, magnesium ribbon.
* Solution N, 1.5 M hydrochloric acid.
* Solution S, 0.4 M sodium hydroxide

You are required to:-

* Determine the rate of reaction of different lengths of magnesium ribbon with hydrochloric acid of different concentrations.
* Draw a graph for the rate of reaction of magnesium ribbon with different lengths of magnesium and determine the time taken for 3.5cm length of the ribbon to react completely.
* Determine the moles per cm length of magnesium solid M.

**Procedure I**

Measure exactly 50.0 cm3 of solution N in 100 ml measuring cylinder and transfer into a clean 100 ml beaker. Measure and cut 2 cm lengths of solid M using a scalpel blade. Drop a 2 cm piece of magnesium in solution N and start a stop-watch simultaneously. Swirl the beaker once and ensure the magnesium is in contact with the acid throughout. Stop the watch immediately the magnesium reacts completely and record in the table I below, the time t, taken for the 2 cm piece to react.

Drop another 2 cm piece of magnesium into the mixture and start a stop-watch simultaneously. Record the time t, taken for the 2 cm piece of magnesium to react. Repeat the procedure by dropping 2 cm piece of magnesium ribbon into the mixture and recording in table I below the time taken for complete reaction.

Calculate the reciprocal for time taken, () for each length and complete table I. **KEEP** the products for use in Procedure II.

 **Table I**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Length of solid M used (cm) | **2** | **4** | **6** | **8** | **10** |
| Time, t, taken for 2 cm piece to react (seconds) |  |  |  |  |  |
| Reciprocal of time , (Sec-1) |  |  |  |  |  |

 (4 mks)

1. Plot a graph of reciprocal of time, () (y-axis) against length of magnesium used. (3 mks)
2. From the graph, determine the time taken for 3.5 cm piece of magnesium to react with the acid. (1 mks)

**Procedure II**

Transfer **all** the products from procedure I into a 100 ml measuring cylinder. Add distilled water to the mixture upto the 100 ml mark. Transfer the solution into the beaker and stir to mix uniformly. Label the mixture as solution P.

Pipette 25.0 cm3 of solution S and transfer into a clean conical flask. Fill the burette with solution P. Titrate solution S with solution P from the burette using 2-3 drops of phenolphthalein indicator. Record the initial and final burette readings in table II below. Repeat the titration two more times and complete the table.

**Table II**

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment Number | **1** | **2** | **3** |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution P used (cm3) |  |  |  |

 (5 mks)

1. Determine the average volume of solution P used.
2. Calculate:
3. the moles of sodium hydroxide in 25.0 cm3 of solution S (1 mk)
4. the moles of hydrochloric acid in average volume of solution P. (1 mk)
5. the moles of hydrochloric acid in 100 cm3 of solution P. (1 mk)
6. (i) Calculate the moles of hydrochloric acid present in 50 cm3 of solution N (1 mk)

 (ii) Determine the moles of hydrochloric acid that reacted with 10 cm of magnesium (1 mks)

 (iii) Given that one mole of magnesium reacts with 2 moles of hydrochloric acid, determine;

1. Moles of magnesium in 10 cm length of magnesium (1 mk)
2. Moles per cm length of magnesium. (1 mk)

**QUESTION 2**.

You are provided with solid T and other reagents to use in this question. You are required to perform the

 tests below, record the observations and inferences. Test for any gases produced.

1. Place half of the solid in a clean dry test-tube. Heat the solid gently and then strongly.

**Observations Inferences**

 (1 mk) (2 mks)

1. (i) Place the remaining solid in a boiling tube. Add about 8 cm3 of distilled water and shake for about

 3 minutes. **KEEP** the product for use in the questions that follow.

**Observations Inferences**

 (1 mk) (1 mk)

 (ii) To a 2 cm3 sample of the product in a test-tube, add 2-3 drops of barium nitrate followed by 2 cm3

 2 M nitric acid.

**Observations Inferences**

 (1 mk) (1 mk)

(iii) To another 2 cm3 of the product in a test tube, add sodium hydroxide dropwise till in excess

**Observations Inferences**

 (1 mk) (1 mk)

(iv) To another 2 cm3 of sample of the product in a test tube, add dilute ammonia solution.

**Observations Inferences**

 (1 mk) (1 mk)

**QUESTION 3**.

You are provided with solid U to use in this question. Carry out the tests outlined below, record the

 observations and inferences.

1. Place half the solid in a clean metallic spatula and burn it over a non-luminous flame.

 **Observations Inferences**

 (1 mk) (1 mk)

1. (i) Place the remaining solid in a boiling tube. Add about 6 cm3 of distilled water and shake to

 dissolve. **Keep all** the product for the tests below;

 **Observations Inferences**

 (1 mk) (1 mk)

(ii) To about 2 cm3 of the solution in a test tube , add 3 drops of acidified potassium manganate

 (vii)

 **Observations Inferences**

 (1 mk) (1 mk)

1. To another 2 cm3 of the solution in a test-tube , add half a spatula of sodium

 hydrogencarbonate.

 **Observations Inferences**

 (1 mk) (1 mk)