** MARANDA HIGH SCHOOL**

**Kenya Certificate of Secondary Education**

 **MOCK EXAMINATIONS 2022**

**233/3 Chemistry Practical Paper 3**

 **September, 2022 Time: 2¼ Hours**

**Name**: ………………………………………….…….…… **Adm** **No**: ………………

**Class**: ………………**Candidate’s** **Signature**: ………..…….. **Date: 8th September, 2022**

 **Time: 8.00-10.15 AM**

***Instructions to candidates***

*(a) Write your Name, admission number and class in the spaces provided in the question paper.*

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

*(c) Answer ALL questions in the spaces provided on the question paper*

*(d) 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 apparatus and chemicals that you may need.*

*(e) All working* ***MUST*** *be clearly shown where necessary*

*(f) Mathematical tables and silent non-programmed electronic calculators may be used.*

**FOR EXAMINERS USE ONLY.**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATES SCORE** |
| **1** | **21** |  |
| **2** | **11** |  |
| **3** | **08** |  |
| **Total Score** | **40** |  |

*This paper consists of* ***9*** *printed pages.*

 *Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.*

1. You are provided with:
* **Solid K** – Magnesium ribbon
* **Solution L** – 2.0M Hydrochloric acid
* **Solution C** – 0.4 M Sodium hydroxide solution
* Stopwatch

You are required to determine:

* the rate of reaction between magnesium and hydrochloric acid at different concentrations
* Mass of magnesium ribbon that reacted

**PROCEDURE I**

1. Place the five test tube on the test tube rack and label them 1, 2, 3, 4 and 5. Using a 10 cm3 measuring cylinder, measure out the volumes of 2.0 M hydrochloric acid, Solution L, as shown in **table 1** below and pour them into the corresponding test tube. **RETAIN** the remaining solution L for use in question 2 and 3. Wash the measuring cylinder and use it to measure volumes of water as indicated in the table and pour into the corresponding test tubes.
2. Cut out FIVE pieces each of **exactly** 1 cm length of magnesium ribbon, Solid K.
3. Transfer all the solution in test tube 1 into a clean 100 cm3 beaker. Place one piece of magnesium ribbon into the beaker and start the stopwatch immediately. Swirl the beaker continuously ensuring that the magnesium is always inside the solution. Record in the table the time taken for the magnesium ribbon to disappear. **TRANSFER** carefully the contents of the beaker into the 250ml volumetric flask. Add 10 cm3 of distilled water into the beaker, swirl and add it to the volumetric flask. **Retain this for Procedure II.**
4. Repeat procedure (iii) for each of the solutions in test tube 2, 3, 4 and 5 and complete the table I below.

**Table 1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test tube Number | **1** | **2** | **3** | **4** | **5** |
| Volume of solution L (cm3) | **10** | **9** | **8** | **7** | **6** |
| Volume of water added (cm3) | **0** | **1** | **2** | **3** | **4** |
| Time taken for the ribbon to disappear (sec.) |  |  |  |  |  |
| Rate of reaction  s-1 |  |  |  |  |  |

 (5 marks)

b) i) Plot a graph of rate of reaction  (y-axis) against volume of **solution L**. (3 marks)



 ii) Using the graph, determine the time that would be taken for a 1 cm length of Magnesium

 ribbon to disappear if the volume of the acid was 7.5 cm3. (1 mark)

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**PROCEDURE II**

To the contents of 250ml volumetric flask from Procedure I, add distilled water to the mark while shaking. Label this as **solution D**. Fill the burette with solution C. Pipette 25 cm3 of solution D into a 250 cm3 conical flask. Add three drops of phenolphthalein indicator and titrate with solution C. Record the results in table 2. Repeat the titration and complete table 2.

**Table 2**

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

 (4 marks)

(a) Determine the average volume of solution C used. (1 mark)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

1. Calculate the number of moles of:
	1. Sodium hydroxide in solution C used. (1 mark)

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* 1. Hydrochloric acid in 25cm³ of solution D. (1 mark)

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* 1. Hydrochloric acid in 250 cm3 of solution D. (1 mark)

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* 1. Hydrochloric acid in 40 cm3 of solution L (1 mark)

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* 1. Hydrochloric acid that reacted with Magnesium. (1 mark)

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1. Determine the mass of Magnesium that reacted. (Mg =24.0) (1 mark)

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1. You are provided with **solid E**. Carry out the following tests and write your observations and inferences in the spaces provided.
	1. Place all of solid E in a boiling tube. Add about 10 cm3 of distilled water and shake thoroughly. Filter the mixture into another boiling tube. **Retain** the filtrate for use in test 2(b) below. Dry the residue using pieces of filter papers.

 i) Place the residue in a dry test-tube. Add 4 cm3 of 2M hydrochloric acid, **solution L**. Retain the mixture for test (iii) below.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|   ,  ( ½ mark) |      (1mark) |

 ii) To 2 cm3 of the solution obtained in (i) above, add aqueous ammonia dropwise until

 in exess.

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

* 1. Use about 2 cm3 of the filtrate obtained in (a) above for tests (i) to (iii) below.

i) Add aqueous ammonia dropwise until in excess.

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

ii) Add about 2 cm3 of 2M hydrochloric acid, **solution L**.

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

iii) Add aqueous sodium hydroxide dropwise until in excess.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|    (½ mark) |      (1mark) |

1. Add three drops of barium nitrate solution.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
|   (1mark) |    (1mark) |

1. You are provided with **solid F**. Carry out the following tests. Write your observations and inferences in the spaces provided.
2. Place all of solid F in a boiling tube. Add about 20 cm3 of distilled water and shake until all the solid dissolves. Label the solution as solution F.

Add about half of the solid sodium hydrogen carbonate provided to 2 cm3 of solution F.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  ( ½ mark) |   ( ½ mark) |

1. (i) Add about 10 cm3 of dilute hydrochloric acid, **solution L**, to the rest of solution F in the boiling tube. Filter the mixture. Wash the residue with about 2 cm3 of distilled water. Dry the residue between filter papers. Place about one third of the dry residue on a metallic spatula and burn it in a Bunsen burner flame.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|   (l mark) |   (l mark) |

(ii) Place all the remaining residue into a boiling tube. Add about 10 cm3 of distilled water and shake thoroughly. Retain the mixture for tests in (c).

|  |  |
| --- | --- |
| **Observations**  | **Inferences** |
|  (l mark) |   (l mark) |

1. Divide the mixture into two portions:
	1. To the first portion, add the rest of the solid sodium hydrogen carbonate.

|  |  |
| --- | --- |
| **Observations**  | **Inferences** |
|  (½mark)  |     ( ½ mark) |

1. To the second portion, add two drops of bromine water.

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

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