**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Adm. No.­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**233/3**

**FORM THREE**

**CHEMISTRY**

**PAPER 3**

**TIME: 2 ¼ Hours**

**MWAKICAN JOINT EXAMINATION TEAM (MJET) 2017**

**Instructions to Candidates**

1. **Answer ALL the questions in the spaces provided in the question paper.**
2. **You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ 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 that you may need.**
3. **All working must be clearly shown.**

**For Examiner’s Use only**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum Score** | **Candidate’s Score** |
| **1**  | **16** |  |
| **2** | **15** |  |
| **3** | **9** |  |

You are provided with:

* Solution R : 0.125M Hydrochloric acid solution.
* x grams of anhydrous sodium carbonate.
* Methyl orange indicator.

You are required to prepare a solution of sodium carbonate and then standardize it with hydrochloric acid solution R.

**PROCEDURE**

Transfer all x grams of Sodium carbonate into a 250ml volumetric flask. Add 100cm3 of distilled water and shake till all the solid dissolves. Add more distilled water upto the 250ml mark and label it solution P. Using a measuring cylinder transfer 50cm3 of solution P into a 250ml beaker and add 50cm3 of distilled water. Stir well with a glass rod and label it solution T. Pipette 25.0cm3 of solution T and place it into a conical flask, add 2 drops of methyl orange indicator and titrate with solution R from the burette. Record your results in the table I below and repeat the titration two more times.

1. i) Table 1

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

(4mks)

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

1. i) Calculate the number of moles of solution R used. (1mk)

ii) Write a balanced equation for the reaction between T and R. (1mk)

 Calculate

 iii) Number of moles of sodium carbonate solution in 25cm3 of solution T. (2mks)

 iv) Number of moles of sodium carbonate in 100cm3 of solution T. (2mks)

 v) Number of moles of sodium carbonate in 50cm3 of the original solution P. (1mk)

1. Given that Na = 23.0, C=12.0, O=16.0

Calculate

1. The mass of sodium carbonate x grams that were dissolved to make solution P. (2mks)
2. The concentration of sodium carbonate solution P in moles per litre. (2mks)

2. You are provided with solid M. carry out the tests below. Identify any gas or gases produced and

 record your observations and inferences.

a) Heat gently half a spatula endful of solid M in a dry test tube. Test the gas with red and blue

 litmus paper.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (1mk) | (1mk) |

b) Place a spatula endful of solid M in a boiling tube. Add 6cm3 of distilled water and shake the boiling

 tube well.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (1mk) | (1mk) |

 (c) Divide the solution into two portions.

 (i) To the first portion add three drops of ammonia solution and then excess.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (2mk) | (1mk) |

 (ii) To the second portion add three drops of Lead (II) nitrate solution and warm.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (2mk) | (1mk) |

II. You are provided with solid J. carry out the test below and record your observations and inferences.

1. Place solid J in a test tube. Half fill it with distilled water and shake well.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (1mk) | (1mk) |

1. Measure about 2cm3 of the solution obtained in (a) above and place it in a test tube. Add 3 drops of Ammonia solution and then excess.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (2mk) | (1mk) |

 3. You are provided with solid A. carry out the tests below. Write your observations and inferences in

 the spaces provided.

1. Place about a spatula full of solid A on a metallic spatula and burn it using a non luminous flame.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (1mk) | (1mk) |

1. Place the remaining solid A in a boiling tube. Add about 8cm3 of distilled water and shake well. Retain the mixture for use in the tests below.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (1mk) | (1mk) |

1. Divide the solution in (b) above into 4 portions.
2. Test the first portion with both blue and red litmus papers.

|  |  |
| --- | --- |
| Observations | Inferences  |
| (1mk) | (1mk) |

1. To the second portion add 3 drops of acidified potassium manganate (VII) and shake well.

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

1. To the third portion add 3 drops of universal indicator and test the PH with a PH chart.

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

1. To the fourth portion add a little amount of sodium hydrogen carbonate.

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