**NAME …………………………..……………….. DATE …………………………**

**INDEX NO. ……….……….…………………...…..… SIGNATURE ……………..…………..**

**233/3**

**CHEMISTRY**

**PRACTICAL**

**PAPER 3**

**TIME: 2**¼ **HOURS.**

**SET 8**

FORM 3

*Kenya Certificate of Secondary Education.*

**INSTRUCTIONS TO CANDIDATES.**

* Write your name and index number in the spaces provided above.
* Answer **ALL** the questions in the spaces provided.
* You are not allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed time for the paper.
* Use the 15 minutes to read through the question paper and note the chemicals you require
* Mathematical tables and electronic calculators may be used.
* All working **MUST** be clearly shown where necessary.
* This paper consists of 5 printed pages.

Candidates should check to ensure that all pages are printed as indicated and no questions are missing

**FOR EXAMINER’S USE ONLY.**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| 1 | 23 |  |
| 2 | 17 |  |
| **Total score** | 40 |  |

**1. (23marks)**

You are provided with:-

* Solution A, sodium hydroxide containing 1.05g in 250cm3 of solution.
* Solution B, a mono basic acid solution HX.
* Solution C, anhydrous metal carbonate M2CO3 (RMM 106) containing 5.3g of the carbonate dissolved in 500cm3 of solution.

You are required to determine:-

1. Molarity of the monobasic acid.
2. Equation for the reaction between the acid HX and the carbonate M2CO3.
3. PROCEDURE I

Fill the burette with solution B. using a pipette and a pipette filler, transfer 25cm3 of solution A into a conical flask. Add 2 drops of methyl orange indicator and titrate it with solution B and record your results in table 1 below.

Repeat the procedure to complete table I below.

Table I

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution B used (cm3) |  |  |  |

(4marks)

1. Calculate the
   1. Average volume of solution B used. (1mark)

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* 1. Concentration of solution A in moles per litre (2marks)

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* 1. Number of moles of A used. (1marks)

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* 1. Number of moles of solution B contained in the average volume. (1mark)

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* 1. Concentration of solution B in moles per litre. (2marks)

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1. **PROCEDURE II**

Fill the burette with solution B. Pipette 25cm3 of solution C into a conical flask. Add 2 drops of methyl orange indicator and titrate it with solution C. Record your results in table II below. Repeat the procedure to complete table II below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution B used (cm3) |  |  |  |

(4marks)

1. Calculate the;
   1. Average volume of solution B used. (1mark)

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* 1. Concentration of solution in moles per litre. (2marks)

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* 1. Number of moles of solution C used. (1mark)

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* 1. Number of moles of solution B that are present in the average volume. (1mark)

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* 1. How many moles of solution B reacts with one mole of solution C. (2marks)

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* 1. Hence, write an equation for reaction between solution B and solution C. (1mark)

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**2. (17marks)**

You are provided with solid D. carry out the following tests on D and record your observations and inferences in the spaces provided.

1. Place a half of solid D in a testtube and heat strongly. Allow to cool. Test any gas(es) evolved with litmus paper.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1 ½ mks | 1mk |

1. Place the remaining half of solid D in a boiling tube and add 10cm3 of distilled water. Shake thoroughly. Filter and divide the filtrate into three portions. Keep the residue for use in (f).

|  |  |
| --- | --- |
| Observations | Inferences |
| 1 mk | 1mk |

1. To portion one, add ammonia solution (Ammonium hydroxide) dropwise then in excess.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1mk | 1mk |

1. To portion two, add 4 drops of lead (II) nitrate solution.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1mk | 1mk |

1. To portion three, add acidified barium nitrate solution.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1 mk | 1mk |

1. Transfer the residue in a testtube and add dilute nitric (V) acid until the solid just dissolves. Test any gas (es) evolved with litmus paper. Divide the solution into two parts.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1 ½ mks | 1mk |

* 1. To part one, add 4 drops of sulphuric (VI) acid.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1mk | 1mk |

* 1. To part two, add ammonia solution dropwise until in excess.

|  |  |
| --- | --- |
| Observations | Inferences |
| 1 mk | 1mk |