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

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

**233/3**

**CHEMISTRY**

**PRACTICAL**

**PAPER 3**

**TIME: 2**¼ **HOURS.**

**SET 9**

**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 8 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 | 21 |  |
| 2 | 19 |  |
| **Total score** | 40 |  |

1. You are provided with:-

* Solution A, Hydrochloric acid.
* Solution B, 0.024 M Sodium hydroxide.
* Solution C, containing 15.74g of Na2CO3. x H20 in 250ml of the solution.

 You are required to:-

1. Prepare a dilute solution of the hydrated sodium carbonate, C.
2. Determine:-

(i) The concentration of solution A.

 (ii) The value of x in the carbonate.

 **Procedure a**

* Using a pipette and pipette filler, place 25.0 cm3 of solution C into a 250ml volumetric flask.
* Add about 200cm3 of distilled water. Shake well.
* Add more distilled water to make upto the mark.
* Label this solution D.
* Retain solution D for use in procedure b and c.

**Procedure b**

* Fill a burette with solution A.
* Using a clean pipette and pipette filler, place 25.0 cm3 of solution B into a 250ml conical flask.
* Add two drops of phenolphthalein indicator and titrate with solution A.
* Record your results in table 1.
* Repeat the titration two more times and complete the table.

**Table 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading |  |  |  |
| Initial burette reading |  |  |  |
| Volume of solution A (cm3) added |  |  |  |

(4 marks)

(a) Determine the:-

 (I) Average volume of solution A used. (1mark)

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 (II) Number of moles of sodium hydroxide in 25cm3 of solution B used. (1 mark)

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 (III) Number of moles of acid in volume of solution A used. (1mark)

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 (IV) Concentration of solution A in moles per litre. (1mark)

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**Procedure C**

* Fill the burette with solution A. Using a pipette and pipette filler, pipette 25.0cm3 of solution D into a conical flask. Add 2 drops of methyl orange indicator and titrate with solution A.
* Record your results in the table.
* Repeat the titration two more times and complete the table.

**Table 2**

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading |  |  |  |
| Initial burette reading |  |  |  |
| Volume of solution A (cm3) added |  |  |  |

(4 marks)

(b) (i) Determine the:-

 (I) Average volume of solution A used. (1 mark)

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 (II) Moles of the acid in the average volume of solution A used. (1mark)

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 (III) Concentration in grammes per litre of the carbonate in solution C. (1mark)

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 (ii Write an equation for the reaction that occurred between the acid and the carbonate. (1mark)

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 (iii) Determine:-

 (I) number of moles of the carbonate in 25cm3 of solution D used. (1 mark)

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 (II) Number of moles of carbonate in 250cm3 of solution D. (1 mark)

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 (III) Concentration of solution C in moles per litre. (1mark)

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 (IV) Value of x in Na2CO3**.**xH2O. (h = 1.0, C = 12.0, O = 16.0 Na = 23.0) (2 marks)

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2. You are provided with 2.5g of solid S in a boiling tube. Carry out the following tests and record your

 observations and inferences in the spaces provided.

- Add 10.0cm3 of distilled water to solid S in the boiling tube.

- Shake well.

- Filter the mixture into a clean boiling tube.

- Label the filtrate as solution S and residue as R.

- Retain both the filtrate and the residue.

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

(i) Place about 2cm3 of solution S in a test tube, add 3 drops of 2M sodium chloride.

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

(ii) Place about 2cm3 of solution S in a test tube, add 2M ammonia solution dropwise till in excess.

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

(iii) Place about 2cm3 of solution S in a test tube, add 3 drops of 0.5M Nitric Acid.

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

(iv) Place about 2cm3 of Solution S in a test tube, add 3 drops of Lead (II) Nitrate solution and warm.

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

(v) Place about 2cm3 of the solution in a test tube, add Barium Nitrate then excess 0.5M Nitric acid.

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

1. Dry the solid residue R in between 2 filter papers. Divide the residue into two.

(i) Place one portion of the residue R in a test tube. Heat gently then strongly. Test any gas with a PH

 indicator paper.

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

(ii) To the other half residue R add few drops of 2M Nitric (v) acid. Test any gas produced with lime

 water – using the glass rod.

|  |  |
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| Observations | Inferences |
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| ( 1 mark) | (1 mark) |

1. You are provided with solid P. Carry out the following tests and record your observations and inferences in the spaces provided.

 Divide solid P into two portions.

(i) Place one portion of solid P in a metallic spatula.

 Heat using a non-luminous flame.

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

(ii) Place one portion in a boiling tube. Add 5 cm3 of distilled water. Shake well. Label this (boiling

 tube) as solution P.

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| --- |
| Observations |
|  |
| ( ½ mark) |

(iii) Place about 2cm3 of solution P in a test tube. Test with litmus papers.

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

(iv) Place about 2cm3 of solution P in a test tube. Add one drop of acidified Potassium Chromate (VI)

 and warm.

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