**NAME: ………………………………………………… Admission No: ..…...……….….……………….**

**SCHOOL: ……………………………………………… Candidate’s signature: …………..……………**

**Date: …………………………...……………….**

**233/3**

**CHEMISTRY**

**PAPER 3**

**(PRACTICAL)**

**October / November, 2017**

**Time: 2 HOURS**

**FORM FOUR ENTRANCE – 2017**

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

**233/3**

**CHEMISTRY**

**PAPER 3**

**(PRACTICAL)**

**Time: 2 HOURS**

**INSTRUCTIONS:**

* + - * Write your Name, Schooland Admission Number in the spaces provided above.
* Answer **ALL** the questions in the spaces provided in the question paper.
* You are **NOT** allowed to start working with the apparatus for the first 15minutes of the 2 hours allowed for this paper. This time will enable you read through the question paper and make sure you have all the chemicals and apparatus required.
* Mathematical tables and electronic calculators may be used.
* All working **must be** clearly shown where necessary.

**For Examiner’s use only**

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| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| 1 | 20 |  |
| 2 | 20 |  |
| **TOTAL SCORE** | 40 |  |

***This paper consists of 6 printed pages***

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

1. You are provided with:
2. Solution A – containing 21.2g per litre of anhydrous sodium Carbonate,Na2CO3.
3. Solution B – Nitric acid solution.
4. Solution c – metal hydroxide M(OH)x

**Procedure I**

1. Fill the burette with solution B.
2. Using a pipette, transfer 25cm3 of solution A into a clean conical flask and add 2- 3 drops of methyl orange indicator.
3. Titrate with solution B from the burette.
4. Repeat the titration to obtain accurate results and record the data in the table below.

**TABLE 1**

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

(4 marks)

1. Find the average volume of solution B used. (1 mark)

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1. The equation for the reaction that has taken place is :-

Na2CO3+2HNO3(aq) 2NaNO3(aq) +H2O(l) + CO2(g)

Calculate the number of moles of sodium carbonate, Na2CO3 in:-

1. 25cm3 of solution A. (3 marks)

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1. Calculate the number of moles of the acid in the litre obtained. (2 marks)

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1. Hence find the molarity of nitric acid solution B. (2 marks)

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**Procedure II**

1. Pipette 25cm3 of solution C into a clean conical flask.
2. Add 2 – 3 drops of the methyl orange indicator.
3. Fill the burette with solution B and carry out the titration.

* Repeat the titration to obtain accurate results and fill in the table (II) below.

**TABLE II**

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

1. Find the average volume of solution B used. (1 mark)

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1. i) Calculate the number of moles of solution B in the reacting volume. (2 marks)

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ii) Calculate the number of moles of C in 25cm3 of solution used. (2 marks)

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iii) Determine the equation for the reaction between the hydroxide M(OH)x and nitric acid. (2 marks)

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iv) What is the value of *x* in M(OH)*x*?. (1 mark)

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1. You are provided with solid W, which is a mixture of two compounds.

Carry out the tests given below on W, Identifying any gases evolved.

* Record your observations and inferences in the table below.

1. Put a spatulaful of the mixture W in about 10cm3 of distilled water and shake. Filter the solution and retain the residue. Divide the filtrate into two portions.

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| --- | --- |
| Observations | Inferences |
| (2 marks) | (2 marks) |

1. i) To the first portion add dilute Sodium hydroxide and warm gently

|  |  |
| --- | --- |
| Observations | Inferences |
| (2 marks) | (1 mark) |

ii) To the second portion add lead (II) nitrate solutuion and warm the mixture gently,

then allow to cool.

|  |  |
| --- | --- |
| Observations | Inferences |
| (2 marks) | (2 marks) |

1. Divide the residue into two portions
2. Put one portion in a test tube and add enough dilute nitric acid until the residue just dissolves.

NOTE: Divide the resulting solution into two portions.

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

1. To the first portion of the solution,add sodium hydroxide solution drop-wise until in excess.

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

1. To the second portion of the solution, add aqueous ammonia solution drop-wise until in excess.

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

1. Put the second portion of the residue in a boiling tube and heat strongly.

|  |  |
| --- | --- |
| Observations | Inferences |
| (2 marks) | (1 mark) |