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

**Class: ……………………………………………………. Date: …............................................**

**233/3**

**CHEMISTRY**

**PAPER 3**

**FORM 4**

**PAVEMENT FORM 4 TRIAL 1 EXAMINATION 2021/2022**

**Kenya certificate of secondary education (K.C.S.E)**

**Time: 2 hours**

1. You are provided with:
* Solution A – containing 21.2g per litre of anhydrous sodium carbonate (Na2CO3(s))
* Solution B – Nitric (V) acid solution
* Solution C – metal hydroxide M(OH)x

**Procedure 1**

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

(4 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| Titre | 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)

1. Given that the equation for the reaction is

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

Calculate;

(i) The number of moles of sodium carbonate in 25 cm3 of solution A (3 marks)

(ii) The number of moles of the acid in the titre volume obtained. (1 mark)

1. Hence find the molarity of nitric (V) acid solution B. (1 mark)

**Procedure II**

1. Pipette 25cm3 of solution C into a clean conical flask.
2. Add 1-2 drops of methyl orange indicator.
3. Titrate with solution b.
4. Repeat the titration to obtain accurate results and fill the table below.

(4 marks)

 Table II

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

1. Find the average titre volume of solution B used. (1 mark)
2. Determine the equation for the reaction between the hydroxide M(OH)x and nitric (V) acid. (2marks)
3. What is the value of x in M(OH)x ? (1 mark)

2. you are provided with solid Q. carry out the following tests below.

a) transfer all of the solid Q into a boiling tube. Add about 6cm3 of distilled water and shake the mixture thoroughly. Allow in to settle and then carefully filter into another boiling tube. **RETAIN THE RESIDUE FOR PART B.**

divide the filtrate into 3 portions

1. To the first filtrate, add a few drops of lead ii nitrate solution and warm.

|  |  |
| --- | --- |
| Observation (1mark) | Inference (1/2 mark) |
|  |  |

1. To the second portion, add sodium hydroxide, dropwise and in excess.

|  |  |
| --- | --- |
| Observation (1mark) | Inference (1/2 mark) |
|  |  |

1. Describe how you would carry out a flame test on the third portion. Proceed and give expected observations.

|  |  |
| --- | --- |
| Procedure (1mark) | Excepted observation (1/2 mark) |
|  |  |

1. On the third portion, carry out a flame test as suggested above

|  |  |
| --- | --- |
| Observation (1mark) | Inference (1/2 mark) |
|  |  |

ii).To the residue in a boiling tube add 2M hydrochloric acid provided drop wise until there is no more change. Test for any gas using a burning splint.

1. Divide the resultant solution into ***two*** portions

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

1. To the first portion, add 2M sodium hydroxide solution drop wise until in excess

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

1. To the second portion, add 2M ammonium hydroxide solution until in excess

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

3. You are provided with:

 **Solid W**

 Bromine water

 Acidified potassium manganate (VII)

 Sodium carbonate

 **Solid W** is suspected to be an organic compound.

(a) Using the reagents provided describe the tests that could be performed consecutively to

 confirm which type of organic compound is **Solid W**. Record the tests and expected

 observations in the spaces provided.

(i)

|  |  |
| --- | --- |
| **Test 1** | **Expected Observations** |
|  |  |
|  |  |
|  |  |
|  |  |

 (1 mark) (1 mark)

(ii)

|  |  |
| --- | --- |
| **Test 2** | **Expected Observations** |
|  |  |
|  |  |
|  |  |
|  |  |

 (1 mark) (1 mark)

(iii)

|  |  |
| --- | --- |
| **Test 3** | **Expected Observations** |
|  |  |
|  |  |
|  |  |
|  |  |

 (1 mark) (1 mark)

(b) Carry out the tests described in (a) above using **solid W** and record the observations and

 inferences in the spaces provided.

(i) Test 1

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  |  |
|  |  |
|  |  |
|  |  |

 (1 mark) (1 mark)

(ii) Test 2

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  |  |
|  |  |
|  |  |
|  |  |

 (1 mark) (1 mark)

(iii) Test 3

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  |  |
|  |  |
|  |  |
|  |  |

(1 mark) (1 mark)