**ASUMBI GIRLS HIGH SCHOOL**

**TERM 2 – DECEMBER 2021**

**FORM 4**

**CHEMISTRY PAPER 3**

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

**Class:** …………………………………………………………. **Candidate’s Sign**: …………………….

**Date:** ………………………………………………………….

**233/3**

**CHEMISTRY**

**PAPER 3**

**TIME: 2 ¼ HOURS**

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

**FORM FOUR**

**Chemistry**

**Practical**

**INSTRUCTIONS TO THE CANDIDATES:-**

* ***Write your name and index number in the spaces provided***
* ***Sign*** *and write the* ***date*** *of examination in the spaces provided*
* ***Answer all the questions in the spaces provided.***
* *Mathematical tables and electronic calculators may be used.*
* *All working* ***MUST*** *be clearly shown where necessary.*
* *Use the first 15minutes of the 2 ¼ hours to ascertain you have all the chemicals and apparatus tha you may need.*

**For Examiners use Only**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATES SCORE** |
| 1 | 15 |  |
| 2 | 11 |  |
| 3 | 14 |  |
| **TOTAL** | 40 |  |

**QUESTION 1**

* You are provided with solution **K** and **L**
* **S**olution **K** is 1M H2SO4
* Solution **L** contains 8.7g of the hydroxide of metal **M** {with formulae MOH] in 600cm3 of the solution
* You are required to carry out the experiment to determine;
1. Concentration of solution L
2. R.A.M of metal **M**

**Procedure**

1. Measure 75cm3 of solution K and put into a clean 250cm3 volumetric flask and add distilled water up to the mark

-label this solution **W**

1. Fill a clean burette with solution W
2. Pipette 25cm3 of solution L into a clean conical flask and add 2 drops of phenolphthalein indicator
3. Titrate the solution **W** in the burette against solution **L** in the conical flask and record the results in the table below
4. Repeat {3} and {4} above as you fill the table below.

**TABLE 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading {cm3} |  |  |  |
| Initial burette reading {cm3} |  |  |  |
| Volume of solution W used {cm3} |  |  |  |

 [4mks]

{a} Calculate the;

{i} Average volume of solution W used [1mk]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{ii} Concentration of solution W [1mk]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{iii} Number of moles of solution W that reacted with each 25cm3 portion of solution L {2mks]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{b} Calculate the;

{i} Number of moles of the metal hydroxide {MOH} in solution L that reacted with each portion of solution W [2mks]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{ii} Concentration of solution L [1mk]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{iii} Number of moles of the metal hydroxide [MOH]in 600cm3 of solution L [2mks]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{iv} R.A.M of metal M [2mks]

[0=16, H=1]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

**QUESTION 2**

You are provided with solution N and P

* Solution N is 2M HCl
* Solution P is 0.16M sodium thiosulphate
* You are required to carry out the experiment below to determine how concentration affects the rate of reaction between HCl and sodium thiosulphate solutions

**PROCEDURE**

1. Fill a clean burette with solution P.

Measure 25cm3 of the solution P from the burette into a clean 100cm3 glass beaker and place on a white piece of paper with a cross[x] marked on it

1. Add 10cm3 of solution N into it and immediately start a stop watch and note the time taken for the cross beneath the mixture to become invisible
2. Clean the 100cm3 beaker and measure into it 20cm3 of solution P form the burette, and add 5cm3 of distilled water into the solution solution
3. Repeat step [2] above and note the time taken for the cross to become invisible
4. Repeat the experiment using volumes indicated on the table below and as you record the results

**TABLE 2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Expt | 1 | 2 | 3 | 4 | 5 |
| Volume of solution p(cm3) | 25 | 20 | 15 | 10 | 5 |
| Volume of water added to solution p{cm3} | 0 | 5 | 10 | 15 | 20 |
| Volume of solution N | 10 | 10 | 10 | 10 | 10 |
| Time taken for the cross to become invisible [in seconds] |  |  |  |  |  |
| $\frac{1}{t}$ S-1 |  |  |  |  |  |

 **(**4mks**)**

[a] plot a graph of $\frac{1}{t}$ against volume of solution P on the grid provided [3mk]

{b} From the graph

{i} Determine the time taken for the cross to become invisible when 12.5cm3 of solution P is used [2mks]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

{ii} Explain the effect of concentration on the rate of reaction between HCl and sodium thiosulphate solution [2mks]

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

**QUESTION 3**

* You are provided with solids Q and R
* You are required to carry out the tests below as you record your observations and inferences
1. **SOLID Q**

-Add about 5cm3 of distilled water to solid Q, shake the mixture thoroughly for a while and then filter it

**NOTE**: Retain both the filtrate and the residue for the tests below

|  |  |  |  |
| --- | --- | --- | --- |
|  | **TEST** | **OBSERVATIONS** | **INFERENCES** |
| (a){i}  | Divide the filtrate into 4 portion-To the first portion, add 4 drops of NaOH |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(1mark\right)$$ |
| {ii} | Scoop the 2nd portion on a metallic spatulaand ignite on a non-luminous flame |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(\frac{1}{2}mark\right)$$ |
| {iii} | To the 3rd portion, add 2 drops of Pb{NO3}[aq] |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(1mark\right)$$ |
| {iv} | To the 4th portion ,add acidified KmnO4 |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(\frac{1}{2}mark\right)$$ |
| b{i} | Put the residue in a test tube and add about 2cm3 of HNO3 |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(1mark\right)$$ |
| {ii} | To the mixture in b{i} above, add 2 drops of KI solution |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(\frac{1}{2}mark\right)$$ |

{**ii}SOLID R**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **TEST** | **OBSERVATIONS** | **INFERENCES** |
| (a) | Scoop a portion of solid R on a Metallic spatula and burn on a Non-luminous flame |  $$\left(1mark\right)$$ |  $$\left(1mark\right)$$ |
| (b){i] | Put the remaining portion of solid R into a clean test tube and add about 3cm3of distilled water, shake and divide into 2 portions |  $$\left(1mark\right)$$ |  $$\left(\frac{1}{2}mark\right)$$ |
| {ii} | To the 1st portion, add 2 drops of acidified KMnO4 and warm |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(1mark\right)$$ |
| {iii} | To the 2nd portion add NaCO3 |  $$\left(\frac{1}{2}mark\right)$$ |  $$\left(1mark\right)$$ |

***THIS IS THE LAST PRINTED PAGE***