Nyaraya Cluster Examination

**Kenya Certificate of Secondary Education**

**2023 Form Four Evaluation Programme**

**233/3 CHEMISTRY PAPER 3**

**JULY/AUGUST 2023**

**Name: ……………………………………………ADM No. ……………..Stream ……….**

**Date…………………… School. ………………………………………………………..**

**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**JULY/AUGUST 2023**

**TIME: 2 HOURS**

Nyaraya Cluster Examination

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

Chemistry

Paper 3

Time: 2 hours

**INSTRUCTION TO CANDIDATES**

1. Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.
2. Answer **ALL** the questions in the spaces provided.
3. KNEC Mathematical tables and electronic calculators may be used
4. All workings **MUST** be clearly shown where necessary.
5. Candidates should answer the questions in English language.

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| Question | Maximum Score | Candidate’s Score |
| 1 | 20 |  |
| 2 | 15 |  |
| 3 | 05 |  |
| **TOTAL** | **40** |  |

*This paper consists of 7 printed pages, check to ascertain that NO page is missing*

**QUESTION 1**

* You are provided with solution **K** and solution **M**
* Solution **K is 1.25M hydrochloric acid**
* Solution **M is 0.16M hydroxide** of metal M with formulae M(OH)x where x is a whole number
* You are required to carry out the experiment to determine the **value of x**

**PROCEDURE I**

1. Using a measuring cylinder, measure 50cm3 of **solution K** into a clean 250cm3 volumetric flask and make up to the mark with distilled water and label this **solution W**

2. Fill a clean burette with **solution W**

3. Pipette 25cm3 of **solution M** into a clean conical flask and add 2 drops of phenolphthalein indicator

4. Titrate **solution M** in the conical flask against **solution K** from the burette and record the results in the table below

5. Repeat [3] and [4] above as you record the results in the table below

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final Burette Reading [cm3] |  |  |  |
| Initial Burette Reading [cm3] |  |  |  |
| Volume Of Solution W Used |  |  |  |

[4mks]

[a] Calculate the;

[i] Average volume of solution W [1mk]

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

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

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

[ii] Concentration of solution W [2mks]

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[iii] Number of moles of hydrochloric acid [in solution W] that reacted with each 25cm3 portion of the solution of the metal hydroxide [solution M] [2mks]

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[iv] Number of moles of the metal hydroxide [solution M] that reacted with each portion of hydrochloric acid [solution W] [2mks]

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[b] Determine the value of X [2mks]

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**PROCEDURE II**

You are provided with:

(i) 0.21M glucose solution V.

(ii) 0.02M potassium Manganese (VII) solution W.

1. 1.0M aqueous sulphuric (VI) acid.

You are required to determine the rate of reaction between solution W and V

at different temperature.

Procedure:

* Place 2cm³ of solution W into a 250ml beakers using 100ml measuring cylinder add 50cm³ of 1.0M sulphuric (VI) acid to the beaker containing solution W.
* Warm the mixture to about 65°C. Stop warming and allow the mixture

to cool.

* When the temperature is exactly 60°C add 15cm³ of solution V and start

the stopwatch immediately.

* Stir the mixture and measure the time taken for the color of the mixture

to change from purple to colorless.

* Record the time in the table below also record the temperature at which

the mixture becomes colorless. Clean the beaker and repeat the procedure

at temperature 55°C, 50°C and 40°C instead of 60°C.

(i) Calculate and complete the table below. (2 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Temp. before mixing (°C) | 60 | 55 | 50 | 45 | 40 |
| Temp. when solution becomes  colorless (°C) |  |  |  |  |  |
| Time in (seconds) |  |  |  |  |  |
|  |  |  |  |  |  |

* 1. Plot a graph of  (y-axis) against temperature at the point when the

Solution becomes colorless. (3mks)

(b) From your graph:-

(i) Determine the time that the reaction would take if the temperature

at which the solution becomes colorless is 42.5°C. (2 marks)

(ii) Describe the slope of your graphs. (1 mark)

2. You are provided with **substance P**. You are required to **write** the **procedure** and the **expected results** and then **carry out** the tests, write your observation and inferences in the space provided.

**SOLID P IS SUSPECTED TO BE SODIUM SULPHATE**

REAGENTS;

* **FLAME AND GLASS ROD**
* **BARIUM NITRATE**
* **DILUTE NITRIC V ACID**
* **DISTILLED WATER**
* **SODIUM HYDROXIDE SOLUTION.**

|  |  |
| --- | --- |
| **TEST 1** | **EXPECTED OBSERVATION** |
| (1 mark) | (1 mark) |

1. **Write the procedures** for the tests to be carried out to confirm the identity of solid P using the reagents given above and give the expected observations in each case.

|  |  |
| --- | --- |
| **TEST 2** | **EXPECTED OBSERVATION** |
| (1 mark) | (1 mark) |

|  |  |
| --- | --- |
| **TESST 3** | **EXPECTED OBSERVATION** |
| ( 1/2 mark) | (1/2 mark) |

|  |  |
| --- | --- |
| **TESST 4** | **EXPECTED OBSERVATION** |
| ( 1/2 mark) | (1/2 mark) |

B. **Carry out** the tests written in A above and in each case give the observations and inference

TEST 1.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| ( 1 mark) | ( 1 mark) |

TEST 2

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| ( 1 mark) | ( 1 mark) |

TEST 3.

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

TEST 4.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| ( 1 mark) | ( 1 mark) |

1. You are provided with **solid F**. carry out the following tests and record the observations and inferences in the spaces provided.
   1. Place about one-third of solid F on clean metallic spatula and burn it in a Bunsen burner flame

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| ( 1mark ) | ( 1 mark ) |

* 1. Place the remaining amount of solid F in a boiling tube. Add about 10cm3 of distilled water and shake. Use the mixture for the tests (i) below.

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

i). To about 2cm3 of the mixture in the test tube, add two or three drops of acidified potassium manganate (VII)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| ( 1 mark) | ( 1 mark) |

**END**