**.Name…………………………………………………….Index No…………………./…………**

**School…………………………………………Adm No…………………Stream………………**

**Date………………………………………………………Sign…………………………………..**

233/3

**CHEMISTRY**

Paper 3

(PRACTICAL)

DECEMBER 2021

**TIME: 2 HOURS**

**SAMIA SUB-COUNTY JOINT EXAMINATION-2021**

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

**CHEMISTRY PAPER 3**

**INSTRUCTIONS TO CANDIDATES**

* *Write your* ***name****,* ***School*** *and* ***Index Number*** *in the spaces provided above.*
* ***Sign*** *and* ***write date*** *of examination in the spaces provided above.*
* *Answer* ***ALL*** *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 for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.*
* *Mathematical tables and electronic calculators may be used.*
* *All working* ***MUST*** *be clearly shown where necessary.*
* *This paper contains 9 printed pages*

**For Examiner’s Use Only**

|  |  |  |
| --- | --- | --- |
| **Questions**  | **Maximum score** | **Candidate’s Score** |
| **1** | **23** |  |
| **2** | **08** |  |
| **3** | **09** |  |
| **Total Score** | **40** |  |

1. You are provided with :

Solution **Q**, 2M Hydrochloric acid.

Solution **P**, 0.15M Sodium thiosulphate

Solution **R**, Sodium carbonate

**Procedure 1**

Measure 20cm3 of 0.15M Sodium thiosulphate (solution **P**) into a 100cm3 a glass beaker. Place the beaker on a white piece of paper with **ink mark ‘X’** on it. Measure 20cm3 of 2M hydrochloric acid solution **Q** using a 50cm3 measuring cylinder. Put the acid into the glass beaker containing Sodium thiosulphate and immediately start off the stop watch. Determine the time taken for the **marks ‘X’** to become invisible/obscured when viewed from above. Repeat the procedure by measuring different volumes of the acid and adding the volume of the distilled water to complete table 1 below.

**Table 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Volume of acid(cm3)** | **Volume of water(cm3)** | **Volume of sodium thiosulphate (cm3)** | **Time taken for mark ‘X’ to be invisible/obscured(seconds)** | **Reciprocal of time (sec-1) I** **t** |
| 20 | 0 | 20 |  |  |
| 18 | 2 | 20 |  |  |
| 16 | 4 | 20 |  |  |
| 14 | 6 | 20 |  |  |
| 12 | 8 | 20 |  |  |
| 10 | 10 | 20 |  |  |

1. Complete the table below (6mks)
2. Plot a graph of I **(rate**) against volume of acid used. (3mks)

 t

1. Explain the shape of your graph (1mk)

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

1. From the graph determine;
2. Time taken for the cross to be obscured/invisible when the volume of the acid is:

15cm3 (1mk)

………………………………………………………………………………………………………………………………………………………………………………………….

8cm3 (1mk)

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

1. The volume of the acid used if the time taken for the cross to be obscured/invisible is:

40seconds (1mk)

…………………………………………………………………………………………………………………………………………………………………………………………..

43 seconds (1mk)

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

**Procedure 2**

Using a 10cm3 measuring cylinder, place 10cm3 of solution **Q** into a **250ml** volumetric flask. Add about 200cm3 of distilled water. Shake well. Add more distilled water to top up to the mark. Labeled this solution **T**. Fill the burette with solution **T**. using a pipette and pipette filler, pipette 25cm3 of solution **R** into a conical flask. Add **3 drops** of phenolphthalein and titrate with solution T.

* Record your results in the table
* Repeat the titration two more times and complete the table

**Table 2**

|  |  |  |
| --- | --- | --- |
| I | II | III |

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette reading(cm3) |  |  |  |
| Initial burette reading(cm3) |  |  |  |
| Volume of solution T (cm3) added |  |  |  |

 (4mks)

1. Determine the :

Average volume of solution **T** used (1mk)

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

Moles of the acid in the average volume of solution **T** used. (2mk)

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

Concentration of solution **R** in moles per litre. (2mks)

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1. Put a spatula end-full of **solid A** into a boiling tube and about 10cm3 of distilled water. Shake the mixture well. Divide the resultant solution into **4 equal** portions.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (½mk) | (1mk) |

1. To the first portion, add a little calcium hydroxide solid and warm. Test any gases produced using both blue and red litimus paper.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. To the second portion, **add 4** drops of hydrogen peroxide solution. Test the gas produced using a glowing splint.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. The solution is also suspected to contain sulphite ions. Using Barium nitrate solution and dilute hydrochloric acid solution. **Describe** how you would confirm presence of the sulphite ions.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. Carry out the actual test as described in (d) (i) above

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. You are provided with solid **B**. carry out the tests below and record your observation and inferences in the spaces provided.
2. Place one third of solid **B** on a metallic spatula. Burn it in a non-luminous flame of the Bunsen burner.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. Place the remaining solid in a test-tube. Add about **6cm3** of distilled water and shake the mixture well. Divide the resulting mixture into 4 portions.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (½mk) | (½mk) |

1. To the first portion, **add 2** drops of acidified potassium manganite (VII)

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. To the second portion, **add 3** drops of acidified potassium dichromate (VI) and warm

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (1mk) | (1mk) |

1. To the third portion, **add 1g** of solid sodium hydrogen carbonate.

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (½mk) | (½mk) |

1. To the fourth portion, **add 5 drops** of ethanol followed by few drops of dilute sulphuric (VI)acid and warm

|  |  |
| --- | --- |
| **Observation**  | **Inferences**  |
| (½mk) | (½mk) |

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