**233/3 CHEMISTRY PAPER 3**

**(PRACTICAL)**

**2 ¼ HOURS**

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

**Candidate’s Signature……………………. Date…………………………….**

**MARCH/APRIL 2023 EXAMINATIONS**

**SUKELLEMO PRE – MOCK EXAMINATIONS**

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

**INSTRUCTIONS TO CANDIDATES**

1. *Write your name and Index number in the spaces provided.*
2. *Sign and write the date of examination in the spaces provided.*
3. *Answer* ***all*** *the questions in the spaces provided in the question paper.*
4. *You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you to read through the question paper and make sure you have all the chemicals and apparatus that you may need.*
5. *This paper consists of* ***8*** *printed pages*
6. *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*
7. *Candidates should answer the questions in* ***English****.*

**FOR EXAMINER’S USE**

|  |  |  |
| --- | --- | --- |
| Question | Maximum score | Candidate’s Score |
| 1 | 22 |  |
| 2 | 11 |  |
| 3 | 7 |  |
| TOTAL SCORE | 40 |  |

**Question 1.**

You are provided with;

* Acid A labelled as **Solution A.**
* 2.0 M sodium hydroxide solution labelled as **Solution B.**
* **Solution C** containing 25.0g per litre of an alkanoic acid.

You are required to determine;

* The Molar mass of the alkanoic acid
* Reaction ratio between sodium hydroxide and acid A.

**PROCEDURE I**

Using a pipette and a pipette filler, place 25cm3 of solution B in to a 250ml volumetric flask. Add about 200cm3 of distilled water. Shake well. Add more distilled water up to the mark and label this as solution B1.

**Retain the remaining solution B for use in procedure II.**

Fill the burette with solution C.

Using a clean pipette and pipette filler, place 25cm3 of solution B1 into a 250ml conical flask.

Add two drops of phenolphthalein indicator to solution B1 in the conical flask and titrate with solution C.

Record your results in table 1.

Repeat the titration two more times and complete the table 1 below. (4marks)

**Table 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading |  |  |  |
| Initial burette reading |  |  |  |
| Volume of solution C cm3 |  |  |  |

Determine;

**(a)**The average volume of solution C used (1mark)

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

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

**(b)**The concentration of solution B1 in moles per litre (2marks)

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

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

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

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

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

**(c)**The concentration of alkanoic acid in solution C in moles per litre. (1 mole of C reacts three moles of the B1 during titration) (2marks)

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

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

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

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

**(d)**The Molar mass of the alkanoic acid. (1mark)

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

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

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

**PROCEDURE II**

Fill a clean burrete with solution A. Place 5cm3 of solution A into a 100ml plastic beaker. Measure the initial temperature of solution A in the beaker and record in table 2. Using a 50ml measuring cylinder, measure 25cm3 of solution B and add it to solution A in the beaker and immediately stir the mixture with a thermometer. Record the maximum temperature reached in table 2. Discard the mixture in the plastic beaker.

Repeat the experiment with other sets of volumes of solution A and B as shown in table 2 and complete table 2 below. (4marks)

**Table 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Volume of solution A (cm3) | 5 | 9 | 13 | 17 | 21 | 25 |
| Volume of solution B (cm3 | 25 | 21 | 17 | 13 | 9 | 5 |
| Maximum Temperature (0C) |  |  |  |  |  |  |
| Initial Temperature (0C) |  |  |  |  |  |  |
| Change in temperature (∆T) |  |  |  |  |  |  |

**(a)**On the grid provided, plot a graph of change in temperature (vertical axis) against volume of solution A (3marks).



**(b)**From the graph determine the volume of solution A which gave the maximum change in temperature (1mark)

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

**(c)**Determine the volume of solution B that reacted with the volume of solution A.(1mark)

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

**(d)**Calculate;

(i)The ratio between volume of solution A and B that neutralized one another. (1mark)

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

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

**(ii)**The concentration in moles per litre of the acid in solution A. (Assume that the volume ratio is the same as the mole ratio) (2marks)

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

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

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

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

**Question 2.**

You are provided with solid D. Carry out the following tests and write your observations and inferences in the spaces provided.

**(a)**Place about a half of solid D in a test tube and heat strongly. Test any gases produced with both red and blue litmus papers.

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

**(b)**Place the rest of solid in a boiling tube and add about 10cm3 of distilled water. Shake well.

To a 2cm3 portion of the solution, add about 1cm3 of hydrogen peroxide and shake well. To the resulting mixture, add aqueous sodium hydroxide dropwise until in excess.

|  |  |
| --- | --- |
| Observations (1 ½ marks) | Inferences ( ½ mark) |
|  |  |

**(c)**You are provided with solution E. Carry out the following tests and write your observations in the spaces provided. Divide solution E into two portions.

**(i)**To the first portion, of solution E, add three drops of barium nitrate solution. Retain the mixture for use in test (ii) below.

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

**(ii)**To the mixture obtained in (c(i) above, add about 2cm3 of 2M nitric V acid.

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

**(iii)**To the second portion of solution E, add two drops of acidified potassium dichromate VI and warm the mixture.

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

**Question3.**

You are provided with substance F. Use it to carry out the tests that follows. Record your observations and inferences in the spaces provided.

**(a)**Describe the appearance of substance F (½ mark)

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

**(b)**Scoop a little of substance F using a clean metallic spatula and ignite it in a Bunsen burner flame.

|  |  |
| --- | --- |
| Observations ( ½ mark) | Inferences ( ½ mark) |
|  |  |

**(c)**Place about 2cm3 of substance F in a clean test tube and add solid G, sodium hydrogen carbonate provided.

|  |  |
| --- | --- |
| Observations (1mark) | Inferences ( ½ mark) |
|  |  |

**(d)**Place about 2cm3 of substance F in a test tube and add 2cm3 of acidified potassium dichromate VI and warm the mixture.

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

(e)Place about 2cm3 of substance F and add 2cm3 of distilled water.

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

**THIS IS THE LAST PRINTED PAGE**