**NAME …………………………..……………….. DATE …………………………**

**INDEX NO. ……….……….…………………...…..… SIGNATURE ……………..…………..**

**233/3**

**CHEMISTRY**

**PRACTICAL**

**PAPER 3**

**TIME: 2**¼ **HOURS.**

**SET 6**

**FORM 3**

*Kenya Certificate of Secondary Education.*

**.**

**INSTRUCTIONS TO CANDIDATES.**

* Write your name and index number in the spaces provided above.
* Answer **ALL** the 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 time for the paper.
* Use the 15 minutes to read through the question paper and note the chemicals you require
* Mathematical tables and electronic calculators may be used.
* All working **MUST** be clearly shown where necessary.
* This paper consists of 6 printed pages.

Candidates should check to ensure that all pages are printed as indicated and no questions are missing

**FOR EXAMINER’S USE ONLY.**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| 1 | 21 |  |
| 2 | 9 |  |
| 2 | 10 |  |
| **Total score** | 40 |  |

**QUESTION 1**

You are provided with:-

* 2.0g of solid M – Impure calcium carbonate.
* Solution A, dilute hydrochloric acid
* Solution B, 0.25M Sodium Hydroxide solution.

You are required to determine

1. Concentration of dilute hydrochloric acid.
2. The percentage of Calcium Carbonate in the mixture.

**Procedure I**

(i) Pipette 25.0cm3 of solution B into a conical flask. Add 2 - 3 drops of methyl orange indicator. Titrate with dilute hydrochloric acid, Solution A from burette. Repeat until you obtain three concordant readings.

Record your results in table I.

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

(4 marks)

(ii) Calculate the;

(I) Average volume of solution A used. (1mark)

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(II) The number of moles of Sodium Hydroxide, solution B contained in 25.0cm3 of 0.25M NaOH.

(1mark)

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(III) Using the mole ratio of reacting Sodium Hydroxide and the Hydrochloric acid, calculate the

concentration of the acid in moles per litre. (2 marks)

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**Procedure II**

(i) Place 2.0g of the mixture M provided into a clean conical flask and add 25cm3 of the dilute hydrochloric

acid to it using a clean pipette, swirl the contents of the flask vigorously until effervescence stops. Using

a 100cm3 measuring cylinder add 75cm3 of distilled water to make up the solution to 100cm3 of

solution. Label this as solution C. Using a clean pipette, transfer 25.0cm3 of solution C into a clean

conical flask and titrate with 0.25M NaOH solution B from the burette using methyl orange indicator.

Repeat the titrate two more times and complete table II.

**TABLE II**

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

(ii) Calculate the

(I) Average volume of sodium hydroxide used. (1mark)

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(II) Number of moles of sodium hydroxide present in the average volume of the solution used. (1mark)

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(III) Number of moles of hydrochloric acid in the 25.0cm3 of solution C used. (1mark)

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(IV) Number of moles of hydrochloric acid contained in the original 25.0cm3 of hydrochloric acid.

(Solution A used) (1mark)

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(V) Moles of hydrochloric acid that were used to react with Calcium Carbonate present in M.

(1½ marks)

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(VI) Number of moles of Calcium Carbonate that reacted with the acid. (1½ marks)

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(VII) Mass of Calcium Carbonate present in 2.0g of mixture. (Ca = 40, C = 12, O = 16) (1mark)

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(VIII) Determine the percentage of Calcium Carbonate present in the mixture. (1mark)

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**QUESTION 2**

You are provided with solid K in a test tube.

You are required to determine the freezing point of solid K.

**Procedure**

Using a test tube holder, immerse the test tube containing solid M into the hot water bath (ensure that half the test tube is immersed). Continue heating the water until the solid melts. Insert a thermometer into the liquid being formed in the test tube and note the temperature when all the solid has just melted. Record the temperature in table III. Remove the test tube from the water and immediately start a stop watch/clock and record the temperatures of the contents of the test tube after every half-minute and complete the table III below. Dip the thermometer into the hot bath to clean it then wipe it with a tissue paper.

**Table III**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (Min) | 0 | ½ | 1 | 1 ½ | 2 | 2 ½ | 3 | 3 ½ |
| Temp. (0C) |  |  |  |  |  |  |  |  |

(a) On the grid provided plot a graph of time (horizontal axis) against temperature (vertical axis) (3 marks)



(b) From the graph determine the freezing point of solid K (1mark)

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**QUESTION 3**

You are provided with solid Q. Carry out the tests below. Write your observations and inferences in the spaces provided.

Transfer all solid Q in a boiling tube and add 10cm3 of distilled water and shake the mixture. Use the solution for the tests below.

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

1. To 2cm3 of solution Q add aqueous ammonia dropwise until in excess.

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

1. To 2cm3 of the solution add aqueous NaOH until in excess.

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

1. (I) To 2cm3 of solution, add 3 drop of Barium Nitrate

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

(II) To the mixture obtained in I above, add 4 drops of dilute hydrochloric acid.

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