**Name: ……………………………………… .Adm. No………………Index No: …………**

**School:……………………………………Candidate’s Sign…………………**

**Date: …………………………………………….**

**233/3**

**CHEMISTRY**

**Paper 3**

**[PRACTICAL]**

**March /April 2020**

**Time: 2 Hours**

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

**FORM FOUR END OF TERM ONE EXAMS 2020**

**Instructions to candidates:**

* Write your name 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 in the question paper.
* 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 the question paper and make sure you have all the chemicals and apparatus that you may need.
* All workings **MUST** be clearly shown where necessary.
* Mathematical tables and silent electronic calculators may be used.

**For Examiners use only.**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum Score** | **Candidate’s Score** |
| 1 | 14 |  |
| 2 | 09 |  |
| 3 | 17 |  |
| **Total marks** | **40** |  |

1. You are provided with the following:

* 1.0M Hydrochloric acid; solution Y
* 0.5M Sodium hydroxide; solution Z

Anhydrous sodium carbonate of unknown mass; solid X

You are required to determine the mass of sodium carbonate that was used in the reaction.

**Procedure**

Using a measuring cylinder, measure 60cm3 of 1M hydrochloric acid, solution Y and transfer into 100cm3 beaker. Add all sodium carbonate (solid X) and stir gently until there is no effervescence. Transfer the solution into a clean 100ml measuring cylinder and add distilled water to make 100cm3 of the solution. Transfer the solution onto 250cm3 beaker and shake. Label this solution F.

Fill the burette with solution Z. Pipette 25.0cm3 of solution F and transfer to a conical flask. Add 3 drops of Phenolphthalein indicator and titrate with solution Z. Record your results in the table 1 below. Repeat the procedure to complete the table.

**(a).Table 1. (4 marks)**

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette readings (cm3) | I | II | III |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution Z (cm3) |  |  |  |

(i). Determine the average volume of solution Z. (1 mark)

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(ii).Calculate the number of moles of sodium hydroxide (solution Z) used. (1 mark)

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(iii). Find the number of moles of hydrochloric acid in 25.00cm3 of solution F (2 marks)

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(iv). Determine the number of moles of hydrochloric acid in 100cm3 of solution F (2 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Calculate the number of moles of hydrochloric acid in the original 60cm3 of solution Y. (1 mark)

(v). Calculate the number of moles of hydrochloric acid in the original 60cm3 of solution Y.

(1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 (vi). Calculate the number of moles of hydrochloric acid that reacted with sodium carbonate.

(1 mark)

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 (vii). Determine the mass of sodium carbonate that reacted with the acid (Na=23, C=12, O=16)

(2 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
2. A. You are provided with

* Solid M
* A thermometer
* A test tube

You are required to determine the melting point of solid M

**PROCEDURE**

a). Place 150cm3 of tap water in a 200 ml or 250 ml beaker

b). Heat the water to near boiling.

c). Insert a thermometer in the test tube containing solid M and take its temperature then record it in the table below under time 0.

d). Using a test-tube holder, immerse the test-tube containing solid M into the hot water

(Ensure that half of the test-tube is immersed) and immediately start a stop Watch/clock and record the temperature of the contents of the test-tube after every Half-minute and complete the table.

e). Dip the thermometer into the hot bath to clean it then wipe it with tissue paper (4 marks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (Min) | 0 | ½ | 1 | 1 ½ | 2 | 2 ½ | 3 | 3 ½ |
| Temperature (oC) |  |  |  |  |  |  |  |  |

(i). On the grid provided, plot a graph of time, (Horizontal axis) against temperature. (3 marks)



(ii). From the graph, determine the melting point of solid M. (1 mark)

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(iii). Name the type of heat change at the melting point. (1 mark)

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(i). Heat gently then strongly half of solid L in a clean dry test tube, test any gas produced using red and blue litmus papers

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 mark] |

Take the remainder of solid L and put into a boiling tube. Add about 10cm3 of distilled water and shake. Divide the solution into 3 portions.

(ii). To the first portion, add aqueous sodium hydroxide dropwise until in excess.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 mark] |

iii). To the second portion, add about 5cm3 of aqueous sodium sulphate.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 marks] |

(iv). To the third portion, add about 2cm3 of lead (II) nitrate.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 marks] |

3.(b). You are provided with solid S perform the following tests and record your observations and inferences in the spaces provided.

(a). Put half of the solid on a clean METALLIC SPATULA ignite it in a non-luminous flame.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1/2 mark] | [1/2  mark] |

(b). Put the remaining solid in a clean boiling tube, add water and shake thoroughly. (Retain this mixture for test bi-biii)

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 mark] |

(b).(i). In about 2cm3 of the mixture add 2 drops of bromine water.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 mark] |

(ii). in about 5cm3 of the mixture add both blue and red litmus paper.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| [1 mark] | [1 mark] |

(iii). use the remaining mixture to determine the pH of the mixture.

|  |  |
| --- | --- |
| **observations** | **Inferences** |
| [1 mark] | [1 mark] |