**NAME…………………………..…………ADM NO……..CLASS.……….**

 **SIGNATURE……………..**

 **DATE…………..........**

**233/3**

**CHEMISTRY PRACTICAL**

**PAPER 3**

**APRIL, 2023**

**TIME: 2**¼ **HOURS.**

**MOMALICHE 2 CYCLE 10.**

**Kenya Certificate of Secondary Education**

**INSTRUCTIONS TO CANDIDATES.**

* Write your name and admission number in the spaces provided above.
* Sign and write the date of examination in the spaces 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 make sure that you have all the chemicals and apparatus that you may require.
* Mathematical tables and electronic calculators may be used.
* All working **MUST** be clearly shown where necessary.
* This paper consists of **7** 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 | 19 |  |
| 2 | 11 |  |
| 3 | 10 |  |
| **Total score** | 40 |  |

1.You are provided with:-

* 2.0 g solid A.
* 2.0 M hydrochloric acid solution B.
* 0.1M Sodium hydroxide solution

You are required to determine the;

1. Enthalpy change (∆H )for the reaction between solid **A** and **one** mole of hydrochloric acid.

**PROCEDURE I**

Using a burette,place 20.0cm3 of 2.0M hydrochloric acid,solution B in a 100cm3 plastic beaker.Measure the temperature of the solution after every half-minute and record the values in table 1.At exactly 2 1/2 minutes,add all of solid A to the acid and stir the mixture gently with the thermometer. Measure the temperature of the mixture after every half-minute and record the values in table 1.Retain the mixture for use in procedure II.

Table 1

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (mins) | 0 | 1/2 | 1 | 11/2 | 2 | 21/2 | 3 | 31/2 | 4 | 41/2 |
| Temperature 0C |  |  |  |  |  |  |  |  |  |  |

(3mks)

 (i) Plot a graph of temperature against time. (3mks)

 (ii) Using the graph, determine the change in temperature (**∆T**) (1mk)

1. Calculate heat change for the reaction.(Assume specific heat capacity of the mixture is 4.2J/g/K, Density of solution=1.0g/cm3)) (2mks)

**Procedure II**

Rinse the burette thoroughly and fill with sodium hydroxide solution. Transfer all the contents of 100cm3 plastic beaker used in procedure I into a 250cm3 volumetric flask. Add distilled water to make up to the mark. Label this solution **C**.

Using a pipette and pipette filler, place 25cm3 of solution C into a clean conical flask and add 2 drops of phenolphthalein indicator and titrate against sodium hydroxide solution. Record your results in table 2 below. Repeat the titration two more times to complete the table 2 below.

**TABLE I**

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of sodium hydroxide solution used (cm3) |  |  |  |

(4mks)

1. Determine the average volume of sodium hydroxide solution A used. (1 mk)

1. Calculate number of moles of;

 (i) sodium hydroxide used (1 mk)

(ii) hydrochloric acid in 25cm3 of solution **C** . (1 mk)

(iii) hydrochloric acid in 250cm3 of solution **C** . (1 mk)

 (iv) hydrochloric acid in 20cm3 of solution B. (1 mk)

1. hydrochloric acid that reacted with solid A. (1 mk)

(c ) Calculate the enthalpy of reaction between solid A and one mole of hydrochloric acid solution B. (1mk)

**2.** You are provided with solid **E**,**F** and **G**. Carry out the tests below and write the observations and inferences in the spaces provided.

1. Place all solid E in a boiling tube and add about 15cm3 of distilled water. Shake the boiling tube until all the solid dissolves. Label this solution **E**. Divide the solution **E** into 4 portions.

|  |  |
| --- | --- |
| Observations | Inferences |
|   (1mk) |  (1mk) |

i) To the first portion of solution E in a test tube, add 4 drops of 2M sulphuric (VI) acid.

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

 ii) To the second portion of solution E in a test tube,add sodium hydroxide drop wise until in excess.

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

1. Place one half of solid F in a test tube .Add 2cm3 of distilled water and shake well. Add 3 drops of this solution to the third portion of solution E.

|  |  |
| --- | --- |
| Observations(1mk) | Inferences(1mk) |

1. To the fourth portion of solution E in a test tube ,add 2 drops of aqueous potassium iodide.

|  |  |
| --- | --- |
| Observations | Inferences |
| (1mk) | (1mk) |

1. Name the cation present in solid E……………………………….. (1mk)

3. You are provided with solid G. Carry out the tests below and write the observations and inferences in the spaces provided.

(a) Using a metallic spatula, place a third of solid **G** and ignite on a non-luminous flame.

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

1. Place the remaining solid G in a boiling tube. Add 10cm3 of distilled water and shake well. Label this solution **G**. Use the solution G for the tests below.
2. To the first portion of solution G in a test tube, determine its pH value.

|  |  |
| --- | --- |
| Observations | Inferences |
|  (1mk) | (1mk) |

 (ii)To the second portion of solution G in a test tube,addd 3 drops of acidified potassium manganite (VII).

|  |  |
| --- | --- |
| Observations | Inferences |
| (1mk) | (1mk) |

 (iii) To the third portion of solution G in a test tube, add 2 drops of bromine water.

|  |  |
| --- | --- |
| Observations | Inferences |
| (1mk) | (1mk) |

 (iv) To the fourth portion of solution G in a test tube,add the remaining solid F.

|  |  |
| --- | --- |
| Observations  | Inferences |
|  (1mk) |  (1mk)  |

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