NAME:…………………………………………………… INDEX NO……………………

SCHOOL……………………………………… CANDIDATE’S SIGN………………

 DATE………………………………….

233/3

CHEMISTRY

Paper 3

PRACTICAL

MARCH 2019

2 ½ hours

**BURAMU I JOINT– 2019**

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

INSTRUCTIONS TO CANDIDATES.

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of exam in the spaces above.
3. Answer ALL the questions in the spaces provided in this question paper.
4. You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed time for the paper.
5. Use the 15 minutes to read through the question paper and note the chemicals and apparatus that you may need.
6. Mathematical tables and electronic calculators may be used.
7. All working MUST be clearly shown where necessary.
8. This paper consists of 8 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 | 18 |  |
| 2 | 12 |  |
| 3 | 10 |  |
| Total score | 40 |  |

1. You are provided with the following:
* 0.5M sodium hydroxide solution A
* 2.0M Hydrochloric acid solution B
* An unknown mass of sodium carbonate solid D

You are required to determine:

* The mass of sodium carbonate
* The molar heat of reaction of sodium carbonate and hydrochloric acid.

***Procedure 1***

Measure 50cm³ of solution B using a 50ml measuring cylinder and place it in a 100ml beaker. Stir gently with a thermometer and record its steady temperature. Add all of solid D at once. Continue stirring and note the highest temperature reached.

 (3marks)

 Table 1.

|  |  |
| --- | --- |
| Highest or lowest temperature (0C) |  |
| Initial steady temperature (0C) |  |
| Change in temperature  |  |

1. Calculate the heat change for the reaction (assume that the density of the mixture is 1g/cm3 and the specific heat capacity of the mixture is 4.2Jg-1K-1) (2marks)

***Procedure 2***

Fill the burette with sodium hydroxide solution A. Transfer the mixture retained in procedure 1 into a 250cm3 volumetric flask. Add distilled water to the mark. Label this solution C. Pipette 25cm3 of solution C into a 250ml conical flask. Add 2-3 drops of phenolphthalein indicator and titrate against sodium hydroxide solution A. Record your results in table 2 below. Repeat the procedure to obtain two more readings to complete the table.

Table 2

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

 (4mks)

1. Calculate:
2. The average volume of sodium hydroxide used (1mk)
3. The number of moles of sodium hydroxide used. (1mk)
4. The number of moles of Hydrochloric acid in 25cm3 of solution C. (1mk)
5. The number of moles of Hydrochloric acid in 250cm3 of solution C (1mk)
6. The number of moles of Hydrochloric acid in 50cm3 of solution B. (1mk)
7. The number of moles of Hydrochloric acid that reacted with solid D (1mk)
8. The mass of sodium carbonate that reacted with solution B (1mk)
9. The enthalpy of reaction between solid D and one mole of Hydrochloric acid i.e Molar heat of reaction of sodium carbonate and Hydrochloric acid. (2mks)
10. You are provided with solid M and carry out the tests below write your observations and inferences in the spaces provided.
11. To a dry boiling tube, place all solid M and add about 12cm3 of distilled water and shake, use the solution for the tests below:-

|  |  |
| --- | --- |
| Observations | Inference |
|     (1mk) |     (1mk) |

ii) To 2cm3 of solution, add 3 drops of Lead (II) nitrate solution

|  |  |
| --- | --- |
| Observations | Inference |
|     (1mk) |     (1mk) |

(iii) To 2cm3 of solution, add 3 drops of Barium (II) chloride solution.

|  |  |
| --- | --- |
| Observations | Inference |
|      (1mk) |      (1mk) |

 (v) To 2cm3 of the solution, add sodium hydroxide solution drop wise until in excess.

|  |  |
| --- | --- |
|  Observations | Inference |
|     (1mk) |      (1mk) |

 (vi) To 2cm3 of solution, add ammonium hydroxide solution drop wise until in excess.

|  |  |
| --- | --- |
| Observations | Inference |
|     (1mk) |     (1mk) |

(vii) To 2cm3 of solution, add 3 drops of aqueous sodium chloride solution

|  |  |
| --- | --- |
| Observations | Inference |
|     (1mk) |     (1mk) |

1. You are provided with solid Q. Carry out the following tests and record your observations and inferences in the table below.
2. Put $\frac{1}{3}$ of solid Q on metallic spatula and heat.

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

1. Put the remaining solid Q in a clean dry boiling tube. Add about 10ml of distilled water and shake. Divide the solution into four portions

|  |  |
| --- | --- |
| Observations | Inferences |
|      |       |

1. To the first portion, add solid sodium hydrogen carbonate provided.

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

1. To the second portion, add three drops of acidified potassium manganate (vii)

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

1. To the third portion, add three drops of bromine water.

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

1. To the third portion, determine the pH using universal indicator and a pH chart.

|  |  |
| --- | --- |
| Observations | Inferences |
|      |       |