Name ……………………………………………………………..Index no………………………

School…………………………………………………………….Date…………….Signature…

233/3

CHEMISTRY PRACTICALS

PAPR 3

SEPTEMBER 2022

TIME: 21/4 HOURS

**KIJISET EXAMINATION 2022**

**JOINT EVALUATION TEST**

 Kenya Certificate of Secondary Education

 Paper 3

 (practicals)

***Instructions to candidates***

1. Write your name, index number, signature and date in the spaces provided above.
2. Answer all the questions in the spaces provided in the question paper.
3. You are not allowed working with the apparatus for the first **15 minutes** of the 21/4 hours allowed for this paper. This time is to enable you the question paper and ensure you have all the chemicals and apparatus that you may need.
4. All workings must be clearly shown where necessary.
5. Mathematical tables and silent electronic calculators may be used.

 **For Examiner’s Use Only**

|  |  |  |
| --- | --- | --- |
| **Question**  | **Maximum score** | **Candidate’s score** |
|  1 |  13 |  |
|  2 |  14 |  |
|  3 |  13 |  |
|  Total  |  40 |  |

**Question 1.**

You are provided with the following:

-Solution A containing 95g of a mixture of sodium carbonate and sodium chloride per litre of solution.

-1M HCl solution B

You are required to determine the percentage of sodium chloride in the mixture

**Procedure:**

Pipette 25cm3 of A and place it in a conical flask. Titrate with B from the burette using 3 drops of methyl orange indicator until a permanent pink colour appears. Repeat the experiment and complete the table below.

**Table I**

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

 (4mks)

1. Calculate the average volume of B used. (1mk)

………………………………………………………………………………………………

………………………………………………………………………………………………

1. Determine the number of moles of B used (1mk)

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

1. Write the ionic equation for the substance that react. (1mk)

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1. Calculate:
2. the number of moles of the base used (1mk)

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

1. the concentration of sodium carbonate (2mks)

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

1. the mass of sodium carbonate in 1 litre of the solution. (Na=23, C=12, O=16) (2mks)

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1. the percentage of sodium chloride in the mixture (1mk)

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**Question 2.**

You are provided with:

-1M HCl solution B

-1M NaOH solution C

You are expected to determine the Molar heat of Neutralization hydrochloric acid

**Procedure:**

Measure 23cm3 of solution B and put it in a 100ml beaker. Measure its temperature and record in the table below under first column. By use of measuring cylinder, measure 5cm3 of solution C and add to solution B in the beaker. Stir with the thermometer and record the final steady temperature. Continue adding 5cm3 at a time and record the temperature till 35cm3 has been added.

1. Complete the table below (4mks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Volume of C added(cm3) | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 |
| Temperature (0C) |  |  |  |  |  |  |  |  |

1. Plot a graph of temperature (vertical axis) against volume of NaOH added. (3mks)



1. From your graph, determine:
2. Volume of 1M NaOH needed to neutralize 23cm3 of 1M HCl (1mk)

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1. Rise in temperature ∆T (1mk)

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1. Calculate the amount of heat evolved in the above reaction. (Take specific heat capacity of solution to be 4.2J/g/K, density of solution, 1g/cm3) (2mks)

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1. Calculate :
2. the number of moles of HCl used (1mk)

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

1. hence determine the Molar heat of neutralization of hydrochloric acid (2mks)

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**Question 3.**

You are provided with mixture P. You are required to perform tests on the mixture in order to determine its composition. Record your observations and inferences in the spaces provided.

1. Place a spatula of solid P on a white tile and observe its appearance.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|   (1/2mk)  |  (1/2mk) |

1. Place the remaining portion of solid P in a boiling tube and add 10cm3 of distilled water. Shake vigorously, filter and retain both the residue and filtrate.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (1/2mk) |  (1/2mk) |

1. Divide the filtrate into 3 portions. To the first portion, add sodium hydroxide drop-wise until excess.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (1mk) |  (1mk) |

1. Dip a glass rod in the second portion and place it at the hottest part of the non-luminous flame.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (1/2mk) |  (1/2mk) |

1. To the third portion, add 3 drops of dilute HNO3(aq), followed by 3 drops of BaCl2(aq).

|  |  |
| --- | --- |
| Observation  | Inferences  |
|    (1/2mks)  |  (1/2mk) |

1. Scrap the residue from the filter paper and place a half of it in a clean dry test-tube. Add about 3cm3 of 2M HNO3(aq). Test foe any gas produced by use of calcium hydroxide solution on a glass rod. Preserve the solution for use in procedure (d) below.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (11/2mks) |  (1/2mk) |

1. Add about 3cm3 of distilled water to the solution obtained in (c) above and shake to mix. Divide the solution into 3 portions.
2. To the first portion, add sodium hydroxide drop-wise until excess.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (1mk) |  (1mk) |

1. To the second portion, add ammonia solution drop-wise until in excess.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (1mk) |  (1mk) |

1. To the third portion, add 2 drops of potassium iodide solution.

|  |  |
| --- | --- |
| Observation  | Inferences  |
|  (1/2mk) |  (1/2mk) |