**NAME: ………………………………………… INDEX NO:..…...……………CLASS ……………..**

**SCHOOL………………………………………… CANDIDATE’S SIGNATURE: ……………………**

 **DATE ………………………………………………..**

**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**JULY/AUGUST 2019**

**TIME: 2**$ \frac{1}{ 4}$ **HOURS**

**SCHOOL BASED FORM 4 EXMINATION 2019**

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

Chemistry

Paper 3

Time: 2$\frac{1}{4}$ hours

**INSTRUCTION TO CANDIDATES**

1. Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.
2. Answer **ALL** the questions in the spaces provided.
3. You are **NOT** allowed to start working with the apparatus for the first 15 minutes of 2 ¼ hours allowed for this paper. This time is to enable you to read the questions paper and make sure you have all the chemicals and apparatus that you may need.
4. KNEC Mathematical tables and electronic calculators may be used
5. All workings **MUST** be clearly shown where necessary.
6. Candidates should answer the questions in English language.

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| Question | Maximum Score | Candidate’s Score |
| 123 | 151015 |  |
| **TOTAL** | **40** |  |

1. You are provided with;
* Solution Q which is 2.0M Hydrochloric acid.
* Solution R containing 12g/dm3 of sodium hydroxide contaminated with sodium nitrate.
* Phenolphthalein indicator.

You are required to

* Prepare a dilute solution of hydrochloric acid.
* Determine the percentage purity of sodium hydroxide in solution R.
1. **I. Procedure**

Using a 50ml measuring cylinder, place 25cm3 of solution Q into a 250ml volumetric flask. Add distilled water to make 250cm3 of solution. Label this solution P. Pipette 25cm3 of solution R into a 250cm3 conical flask. Add 2 drops of Phenolphthalein indicator. Fill the burette with solution P and titrate it against solution R until it just turns colourless. Repeat the titration two more times and complete the table below.

**Table 1**

|  |  |  |  |
| --- | --- | --- | --- |
| Titration | I | II | III |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution P (cm3) |  |  |  |

 (4 mks)

1. Determine the average volume of solution P used. (1 mk)

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1. Calculate the number of moles in;
2. 250cm3 of solution P (2 mks)

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1. Solution P that reacted (2 marks)

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 c) Calculate the ;

 i) Name the moles of sodium hydroxide, solution R used. (2 marks)

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 ii) Mass of sodium hydroxide in the 1dm3 volume of solution R. (2 marks)

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 iii) Percentage purity of sodium hydroxide. (2 marks)

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1. You are provide with;

i) 4.5g of solid B

ii) Distilled water

You are required to determine the solubility of solid B in 100g of water ate different temperatures.

**Procedure**

 Fill the burette with distilled water. Put 20cm3 of distilled water into a boiling tube with solid B. Warm the mixture while stirring with a the thermometer until all solid B dissolves. Remove the boiling tube from the Bunsen burner and continue to stir the solution with the thermometer as it cools. Note the temperature at which the crystals first appear and record it in the table II below. Add 2.0cm3 of distilled water into the mixture and repeat the procedure. Continue adding the 2.0cm3 of distilled water and repeat the procedure to complete the table II below. Also calculate the solubility of solid B at different volumes to complete the table

 **Table II**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Total mass of water | 20 | 22 | 24 | 26 | 28 | 30 |
| Add to 4.5 of solid B |  |  |  |  |  |  |
| Solubility of B per 100g of water | 22.5 |  |  |  |  |  |
| Temperature at which the crystals first appear (0C) |  |  |  |  |  |  |

1. Plot the graph of solubility of B against temperature at which the crystals first appear. (3 marks)



1. From the graph determine the solubility of solid B at 450C. (1 mark)
2. You are provided with solid W.

Carry out the tests below and record your observation and inferences in the spaces provided.

1. Place solid W in a boiling tube and add about 10cm3 of distilled water and shake well.

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

ii) To about 2cm3 portion add sodium hydroxide dropwise until in excess.

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

1. To another 2cm3 portion add aqueous ammonia dropwise until in excess.

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

1. To the third 2cm3 portion add 3 drops of sodium sulphate solution.

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

1. To the fourth 2cm3 portion add 3 drops of potassium iodide.

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

b) You are provided with solution F. Carry out the tests below and record your observations and

 inferences in the spaces provided.

1. Add about 5cm3 of distilled water to all the solution F in a boiling tube and shake.

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

1. To about 2cm3 portion of solution F, add 3 drops of acidified potassium manganite (VII).

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

1. To about 2cm3 portion of solution F add sodium hydrogen carbonate solid.

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

1. To about 2cm3 of solution F add 3 drops of universal indicator solution.

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