**NAME: ……………………………………. INDNO: ……………………………..**

**CLASS: ………………………… SIGNATURE: …..………………..**

**ADM.NO………………………………..DATE:……………………………………………**

**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**AUGUST 2022**

**2 ¼ Hours**

**LONDIANI SUBCOUNTY JOINT MOCK**

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

**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.
* All workings must be clearly shown where necessary. Mathematical tables and silent electronic calculators may be used.
* Answer all the questions in English.

**For Examiners use only.**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum Score** | **Candidates Score** |
| 1 | 20 |  |
| 2 | 10 |  |
| 3 | 10 |  |

*This paper consists of 8 Printed pages.*

*Candidates should check the question paper to ensure that all the*

*Papers are printed as indicated and no questions are missing.*

1. You are provided with:

• 2.0gof substance A, labelled solid A.

• Solution B, 0.05 M hydrochloric acid.

• Methyl orange indicator. .

You are required to determine the:

• Solubility of substance A in water.

• Relative formula mass of substance A.

**PROCEDURE!**

(i) Place 200 cm3 of tap water in a 250 ml beaker and keep it for use in step (vi).

(ii) Place **all** of substance A in a dry boiling tube.

(iii) Using a burette, measure 10.0 cm3 of distilled water and add it to the substance A

in the boiling tube,

(iv) While stirring the mixture in the boiling tube with a thermometer, warm the mixture

using a Bunsen burner, until the temperature rises to 65°C. Stop warming the mixture,

(v)Allow it to cool while stirring with the thermometer,

(vi)When the temperature drops to 60°C, start the stop watch/clock, place the boiling tube

in the beaker with tap water prepared in step (i) above

(vii) Continue stirring and record the temperature of the mixture after two minutes, then

thereafter record the temperature of the mixture after every one minute interval and

complete **table 1. Retain the mixture with the thermometer inside for use**

**in procedure II below.**

**Table 1**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (minutes) | 0 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Temperature (°C) | 60 |  |  |  |  |  |  |  |  |  |

(4 marks)

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

1. Using the graph, determine the temperature (Ts) when 2g of substance A dissolves completely in 10.0cm3 of distilled water. 1 mk

b) Calculate the solubility of substance A in grams per 100 g water at temperature, Ts. 2mks

**PROCEDURE II**

Using a funnel, transfer all the mixture obtained from Procedure I into a 250 ml volumetric flask. Rinse the boiling tube and the thermometer with about 20 cm3 of distilled water and add the rinses into the volumetric flask. Repeat the rinsing two more times. Add about 100 cm3 of distilled water to the volumetric flask. Shake until all the solid dissolves. Add more distilled water to the mark. Label this as solution A. Fill the burette with solution A. Using a pipette and **pipette filler,** place 25.0 cm3 of solution B, into a 250 ml conical flask. Add three (3) drops of the indicator provided and titrate using solution A. Record your readings in **table** 2 below. Repeat the titration two more times and complete the tabTable 2

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

4mks

a) Calculate the

i) Average volume of solution A used 1mk

ii ) Number of moles of hydrochloric acid, solution B used. 1mk

b) Given that two moles of acid react with one mole of substance A, calculate:

i) Number of moles substance A used. 1mk

ii) Concentration of solution A in moles per litre 1mk

iii) Concentration of solution A in g per litre: 1mk

iv) Relative formula mass of substance A 1mk

1. You are provided with solid **E**. Carry out the following tests and write your observations and inferences in the spaces provided.
2. Describe solid E. (1mk)
3. Place about one-half of solid **E** in a dry test-tube. Heat it strongly and test any gas produced

Using hydrochloric acid, solution **B** on a glass rod.

**Observations Inferences**

(1 mark) (1 mark)

c) Place the rest of solid **E** in a boiling tube. Add about 10cm3 of distilled water. Shake well and use 2cm3 portions for each of the tests below.

(i) To one portion, add aqueous ammonia dropwise until in excess

**Observations Inferences**

(1 mark) (1 mark)

(ii) To a second portion, add about 1cm3 of hydrochloric acid.

**Observations Inferences**

(1 mark) (2 marks)

(iii) To a third portion, add two drops of aqueous lead (II) Nitrate and heat the mixture to boiling.

**Observations Inferences**

(1 mark) (1 mark)

3. You are provided with liquid L. Carry out the tests below. Write your observations and inferences in the spaces provided.

(a) To 2cm3 of liquid **L** add 2cm3 of distilled water.

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

(i) To 2cm3 of liquid **L** , add 3drops of bromine water.

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

1. To about 2cm3 of liquid L, add small amount of sodium hydrogen carbonate.

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

1. To about 2cm3of liquid L , add 2 drops of acidified potassium manganate (VII) solution then warm.

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

1. To about 2cm3 of liquid L add about 2cm3 of liquid P provided followed by 6 drops of 2M sulphuric(VI) acid and warm.

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

**Confidential joint mock August 2022**

**Each candidate to be provided with the following.**

1. Solid A –measure accurately 2.0g of anhydrous sodium hydrogen carbonate.
2. 100cm3 of solution B- 0.05M hydrochloric acid.
3. Methyl orange indicator.
4. Accessible to 500cm3 of distilled water.
5. 50ml burette.
6. 25ml pipette with a pipette filler.
7. 2-250ml conical flasks.
8. -10oC-110oC Thermometer.
9. Source of heat.
10. Test tube holder.
11. Stop clock / stop watch.
12. 250ml volumetric flask.
13. A funnel.
14. A means of labelling.
15. A boiling tube.
16. 6 test tubes in a test tube rack.
17. About 0.5g of solid E - Ammonium Aluminium Sulphate.
18. About 10cm3 of liquid L- absolute ethanol.
19. About 0.2g of sodium hydrogen carbonate.
20. A stirring rod.
21. 10cm3 measuring cylinder.

Accessible to the following.

1. 2M hydrochloric acid.
2. 2M ammonia solution-with dropper.
3. Acidified potassium manganate(VII) with a dropper.
4. 1% bromine water. With a dropper.
5. Liquid P - Glacial ethanoic acid.
6. 0.5 M lead(II)nitrate solution with a dropper.