Name: ………………………………………………………… Index No. ……………………………………..

Date: …………………………………………………………. Candidate’s Sign. ………….............................

**233/3**

**CHEMISTRY**

Paper 3

(Practical)

**SET 7**

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

**FORM THREE**

**INSTRUCTIONS TO THE CANDIDATES:**

1. Answer **ALL** questions in the spaces provided in this question paper.
2. You are **NOT** allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemical and apparatus that you may need.
3. All working **MUST**be clearly shown where necessary.
4. Mathematical tables and electrical calculators may be used.

**For Examiners’ Use Only**

|  |  |  |
| --- | --- | --- |
| **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| **1a** | 11 |  |
| **1b** | 17 |  |
| **2** | 12 |  |
| **Total** | **40** |  |
|  |  |  |

*This paper consists of 5 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

1. You are provided with

* Solution A containing 8.0g per litre of Sodium carbonate
* Aqueous hydrochloric acid, solution B
* 4.0g of solid D, a basic compound of the formula, Na2X.2H2O

You are to determine the:

* Concentration of solution B
* Number of moles of water of crystallization in a hydrated compound, Na2X.nH2O

Procedure I

Fill a burette with solution A. using a pipette and pipette filler placve 25.0cm3 of solution B into a 250ml conical flask. Add 2 drops of methy orange provided and titrate with solution A. record your results in table 1. Repeat the titration two more times and complete the table.

(a) Table 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette readings |  |  |  |
| Initial burette reading |  |  |  |
| Volume solution A used (cm3) |  |  |  |

What is the average volume of solution A used? (1mk)

(b) Determine the concentration of solution A.( Na=23.0,O=16.0,C=12.0) (1mk)

(c) Determine the

 (i) number of moles of hydrochloric acid in the volume of solution B used (2mks)

 (ii) the concentration of solution B (1mk)

**PROCEDURE II**

Place all the solid D provided in a 250ml beaker. Add about 100cm3 of distilled water and stir to dissolve all the solid. Transfer the solution obtained into a 250ml volumetric flask. Rinse the beaker with distilled water to the volumetric flask. Add more distilled water to the volumetric flask to make to the mark. Label this solution D.

Fill the burette with solution D. using a pipette and pipette filler place 25.0cm3 of solution B into a clean 250ml conical flask. Add 2 drops of methyl orange indicator and titrate with solution D. record your results in table 2. Repeat the titration two more times and complete the table.

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette readings |  |  |  |
| Initial burette reading |  |  |  |
| Volume solution D used (cm3) |  |  |  |

What is the average volume of solution D used? (1mk)

(e) Given that one mole of D reacts with two moles of hydrochloric acid determine:

 (i) moles of D in the volume of solution D used. (2mks)

 (ii) concentration of solution D (1mk)

(f) Determine the

 (i) relative formula mass of substance D (2mks)

 (ii) number of moles of water of crystallization in the basic compound Na2.nH2O

 (R.F.M of X=155, RAM of Na=23.0, O=16.0, H=1.0) (2mks)

2. You are provided with solid E. carry out the tests below.

 Write your observations and inferences in the spaces provided.

(a) Place one half of solid E in a clean dry test tube and heat it strongly. Test for any gas(es) produced by bringing glass rod dipped in concentrated hydrochloric acid, solution G, close to the mouth of the test tube.

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

(b) Place the other half of solid E in a boiling tube. Add about 10cm3 of distilled water and shake until all the solid dissolves (use the solution for the tests (i),(ii) and (iii)

(i) To about 1cm3 of the solution in a test tube add aqueous ammonia dropwise until in excess

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

(ii) To about 2cm3 of the solution add five drops of lead (II) nitrate solution

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

(iii) To about 1cm3 of the solution add five drops of Barium nitrate solution

|  |  |
| --- | --- |
| Observations  | Inferences  |
|  1mark |  (2mark) |

(iv) To the mixture obtained in (iii) above add about 2cm3 of dilute hydrochloric acid, solution B

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

3. You are provided with solid F. carry out the tests below and record your observations and inferences in the spaces provided

 (a) Ignite half of solid F provided in a clean metallic spatula using non-luminous flame of the Burnsen burner

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

(b) Place the remaining portion of solid F in a boling tube. Add about 5cm3 of distilled water and shake thoroughly

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

(c) Place about 2cm3 of the solution obtained in (b) in a test-tube and add 2 drops of bromine water

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