**NAME: ……………………………………………………………… IDM. NO.: ………………………..............**

**SCHOOL ………………………………………………………… DATE: ……………………….…….................**

**CANDIDATE’S SIGN……….…………………………………………**

**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**INSTRUCTIONS TO THE CANDIDATES**

* *Write**your* ***name school*** *and* ***index number in the spaces provided***
* ***Sign*** *and write the* ***date*** *of examination in the spaces provided*
* *Answer* ***all*** *the questions in the spaces provided****.***
* *You are not allowed to start working with apparatus for the first 15minutes of the 2 ¼ hrs allowed for this paper. This time is enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need*
* *Mathematical tables and electronic calculators may be used.*
* *All working* ***MUST*** *be clearly shown where necessary.*
* *Mathematical tables and electronic calculator may be used.*

**FOR EXAMINERS USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAX. SCORE** | **CANDIDATE’S SCORE** |
| 1 | 20 |  |
| 2 | 14 |  |
|  | 06 |  |
| **Total Score** | **40** |  |

*This paper consists of 8 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:

* Solid A : 0.5g of metal carbonate M2CO3
* Solution B: 0.2M sulphuric (vi) acid solution
* Solution C: sodium hydroxide solution

You are required to determine:

* The relative formula mass of M2CO3
* Relative atomic mass of M

**PROCEDURE I**

Fill the burette with solution B. Pipette 25cm3 of solution C and transfer into a conical flask. Add two drops of phenolphthalein indicator. Titrate against solution B from the burette. Repeat two more times and record your results in table 1.

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
| Titre | i | ii | iii |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution B used (cm3) |  |  |  |

(4mks)

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

(b) Calculate the moles of sulphuric (vi) acid that reacted. (1mk)

(c) Calculate the concentration of sodium hydroxide solution **C**. (3mks)

**PROCEDURE II**

Using a 100ml measuring cylinder, measure 100cm3 of solution B and transfer into a clean conical flask. Add the whole of solid A to the solution B in the conical flask. Shake to dissolve solid A until no more effervescence occurs. Label the resultant solution as D.

Pipette 25cm3 of solution C and transfer into a conical flask and add two drops of phenolphthalein indicator. Fill the burette with solution D. titrate solution C against solution D from the burette. Repeat two more times and record your results in table II.

**Table II**

|  |  |  |  |
| --- | --- | --- | --- |
| Titre | i | ii | iii |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution D used (cm3) |  |  |  |

(4mks)

(a) **Calculate:**

(i) The average volume of solution **D** used. (1mk)

(ii) The moles of solution **D** in d(i) above. (2mks)

(iii) The moles of H2SO4 in 100cm3 of solution **D**. (2mks)

(iv) The moles of in H2SO4 100cm3 of solution **B**. (1mk)

(v) The number of moles of the acid (**solution B**) that reacted with the carbonate. (1mk)

(vi) The moles of carbonate in 0.5g of the carbonate. (2mks)

(e) **Calculate;**

(i) The relative formula mass of the carbonate. (2mks)

(ii) The relative atomic mass of **M.** (1mk)

2. You are provided with solid **Q**. carry out the tests below. You should identify any gases evolved. Record your observations and inferences in the table below.

(a) Place half of solid **Q** in a test tube and heat strongly.

|  |  |
| --- | --- |
| observation | inference |
| (2mks) | (1mk) |

(b) Place the remaining solid **Q** in a test tube and add 3cm3 of distilled water. Divide the resultant mixture into two portions

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | ( ½ mk) |

(c) To the first portion add aqueous ammonia drop wise till in excess.

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1mk) |

(d) To the second portion add barium nitrate solution followed by dilute nitric acid

|  |  |
| --- | --- |
| observation | inference |
| (2mks) | (1mk) |

1. You are provided with solid P. carry out the tests below and record your observations and inferences in the table below.
2. Place half of solid P in a clean spatula and ignite.

|  |  |
| --- | --- |
| observation | inference |
| (11/2mks) | (1/2mk) |

1. Transfer the remaining solid P into a test tube and add about 4 cm3 of distilled water and shake. Divide the resultant mixture into two portions.
2. To the first portion add two drops of acidified potassium manganate (vii)

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1/2mk) |

1. To the second portion add two drops of acidified potassium dichromate (vi)

|  |  |
| --- | --- |
| observation | inference |
| (1mk) | (1/2mk) |