**NAM**E**…………………………………………………..…………………… Index No. ……………………**

233/3

CHEMISTRY PAPER 3 PRACTICAL

May/June, 2017.

TIME: 2¼ HOURS

**INSTRUCTIONS TO CANDIDATES:**

* Write your name and index number and school in the spaces provided.
* Sign and write the date of examination in the spaces provided above.
* Answer **ALL** questions in the spaces provided in this question paper.
* You are **NOT** allowed o start working with the apparatus for the first 15 minutes of 2¼ hours

allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.

* All workings **MUST** be clearly shown where necessary.
* Mathematical tables and electronic calculators may be used.

**1.** You are provided with :

* Solution **A** containing 7.2g of hydrochloric acid in a litre.
* Solution **B** containing 7.5g a mixture of sodium chloride and anyhydrous sodium carbonate in 500cm3 of solution.

You are required to determine the percentage by mass sodium carbonate in the mixture.

**Procedure**

(i) Fill the burette with solution **A.**

(ii)Using a pipette and pipette filler, place 25cm3 of solution **B** a clean conical flask and add 2 drops of methyl orange.

(iii) Titrate solution **B** with **A** and record your results in the table 1 below.

(iv) Repeat two more times and complete the table 1 below.

**Table 1**

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

 (4mks)

(a) (i) Calculate the average volume of **A** used (1mk)

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 (ii) Write a chemical equation for the reaction taking place. (2mk)

 (iii) Determine the molarity of the hydrochloric acid, solution **B.** (1mk)

 (H= 1, Cl= 35.5)

 (b) Calculate the:

 (i) Number of moles of **A**, hydrochloric acid used. (1mk)

 (ii) Moles of sodium carbonate in the 25.0cm3 (1mk)

 (iii) Moles of sodium carbonate in the 500cm3 solution. (1mk)

 (iv) Mass of sodium carbonate in the solution **B** in the 500cm3. (2mk)

 (Na=23, C=12, O=16).

 (v) Percentage by mass of sodium carbonate in the mixture. (1mk)

**2.** You are provided with:

0.2M hydrochloric acid , **solution C.**

* 0.2M sodium thiosulphate, **solution D**.
* Distilled water.

You are required to determine the rate of reaction between hydrochloric acid and sodium thiosulphate.

**Procedure**

 (i) Using a clean measuring cylinder, measure 50cm3 of solution D and place it in 250 cm3 beaker made of glass.

 (ii) Draw across on a white piece of paper.

 (iii) Add 10 cm3 of solution C, swirl the mixture and place it on a paper with the cross, start the stop watch immediately.

 (iv) Observe the cross through the solution from above and **note the time taken for the cross to be obscured.**

 (v) Repeat the experiment with 40 cm3 of solution D and 10 cm3 of distilled water then add 10 cm3 of solution C, **record the time taken for the cross to be obscured**.

 (vi) Repeat the experiment using 30 cm3, 20 cm3 and 10 cm3 of solution D, topping up with distilled water and then adding 10 cm3 of solution C. Fill the table 2 below.

**Table 2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Experiment number** | **1** | **2** | **3** | **4** | **5** |
| **Volume of solution D (cm3)** | 50 | 40 | 30 | 20 | 10 |
| **Volume of water (cm3)** | 0 | 10 | 20 | 30 | 40 |
| **Volume of solution C (cm3)** | 10 | 10 | 10 | 10 | 10 |
| **Time in seconds (t)** |  |  |  |  |  |
| **1/t** |  |  |  |  |  |

 (7mks)

 (a) Plot a graph of 1/t against volume of D . (3mks)



(c) How does the rate of reaction of hydrochloric acid and the concentration of sodium thiosulphate relate? (1mk)

(d) From the graph , find the time in seconds taken by 35cm3 of solution D and 15cm3 of water when reacted with 10cm3 of hydrochloric acid for the cross to be obscured. (2mks)

**3.** You are provided with solid **E**. carry out the following tests and record your observations and inferences in the spaces provided.

 Put all solid **E** in a boiling tube. Add about 15cm3 of distilled water and shake until all the solid dissolves. Use 2cm3 portions of the solution in a test tube , for each of the tests in (a), (b), (c), (d), (e) and (f).

(a) Add sodium hydroxide solution drop wise till in excess.

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

(b) Add ammonia solution drop wise till in excess.

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

(c ) Add 3 drops of sodium carbonate solution .

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

(d) Add 3 drops of dilute hydrochloric acid.

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

(e) Add 3 drops of barium chloride solution.

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

(f) Add 3 drops of lead (II) solution.

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