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| **233/3 -** | **CHEMISTRY (PRACTICAL)**  | **- Paper 3** |
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**Name ……………………………………………… Index Number ………………………... Class ………………………................. Candidates Signature……………………………. Date ……………………………………**

**INSTRUCTIONS TO THE CANDIDATES:-**

a) Write your name and index number in the spaces provided above.

b) Answer ALL the questions in the spaces provided in the question paper

c) You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ 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.

d) Mathematical tables and silent electronic calculators may be used e) All workings MUST be clearly shown where necessary.

**FOR EXAMINER’S USE ONLY**

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| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATES SCORE** |
| 1 | 22 |  |
| 2. PART (I). | 10 |  |
| 3. PART (II). | 08 |  |
| TOTAL SCORE | 40 |  |

***This paper consists of 8 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicate and no questions are missing***

**1**. You are provided with;

- A dibasic acid labeled solution **A**

- Solution **B** containing 5.56g per litre of potassium carbonate

- Aqueous sodium hydroxide labeled solution **C**

You are required to determine the:

- Concentration of solution **A** in moles per litre

- Molar heat of neutralization of solution **C** with sodium hydroxide labeled solution C

**A Procedure I**

Using a pipette filler, place 25cm3 of solution **A** into a 250ml volumetric flask. Add water to make 250cm3 of solution label this solution **D**. Place solution **D** in a burette. Clean the pipette and use it to place 25.0cm3 of solution **B** into a conical flask. Add2 drops of methyl orange indicator provided and titrate with solution **D**. Record your results in table 1. Repeat the titration two more times and complete the table.

Table 1

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

(**4mks**) Calculate the:

i) Average volume of solution **D** used

(**1mk**)

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ii) Concentration of potassium carbonate in solution **B** (K = 39.0, O = 16.0, C = 12.0)

(**1mk**)

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iii) Concentration of dibasic acid in solution **D**

(**2mks**)

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iv) Concentration of dibasic acid in solution **A**

(**1mk**)

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**B. Procedure II**

Clean the burette and fill it with solution **C**. Clean the pipette and use it to place 25.0cm3 of solution **A** into a 100cm3plastic beaker. Measure the initial temperature of this solution and record it in table 2.

From the burette, place 5cm3 of solution **C** into the beaker containing 25.0cm3 of solution **A**, stir the mixture carefully and record the highest temperature of the mixture in table 2. Place another 5cm3 of solution **C** into the mixture in the beaker, stir carefully and record the highest temperature of this mixture in table 2. Continue this procedure of placing 5cm3 portions of solution **C** and complete table 2

Table 2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Total volume of solution **C** added (cm3) | 0 | 5 | 10 | 15 | 20 | 25 | 30 |
| Volume of solution **A** (cm3) | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Temperature (0C) |  |  |  |  |  |  |  |

(**3mks**)

**i**) On the grid provided, draw a graph of temperature (vertical axes) against volume of solution **C** used. (**3mks**)

**ii**) From the graph, determine

(**1mk**)

**I** The highest temperature change, T

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**II** The volume of solution **C** required to react with 25cm3 of solution **A**.

(**1mk**)

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**iii**) Calculate the

**I** The number of moles of solution **A** used (**1mk**)

**II** Molar heat of neutralization of **A** with sodium hydroxide solution labeled **C**

(Assume the specific heat capacity of the solution is 4.2Jg-1K-1 and density of solution is 1.0g cm-3)

(**2mks**

**Question 3**. **PART( I)**.

You are provided with solid **G** and **H**. Carry out the tests and record your observation and inferences in spaces provided.

(**a**) Place all solid **G** in a clean boiling tube. Add about 10cm3 of distilled water and shake well.

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

Divide the solution into 4 portions.

(**i**) To the first portion add 2-3 drops of sodium hydroxide until in excess. (**ii**) To the second portion add 2-3 drops of aqueous ammonia until excess. (**iii**) To the third portion add 3 drops of dilute hydrochloric acid,.

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

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

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

(**iv**) To the fourth portion, add 3 drops of Lead (ii) nitrate solution followed by dilute nitrate followedby dilute nitric acid.

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

**Question 3. PART ( II).**

You are provided with solid **H**. Carry out the tests below. Record your observations and

inferences in the spaces provided.

flame.

**a**) Place a half of solid **H** in a clean metallic spatula and ignite it on Bunsen burner

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

**b**) Put the remaining portion of solid **H** in aboiling tube and add about 12cm3 of

distilledwater. Shake to dissolve.

**i**)To about 2cm3 of solution J in a test tube add 2 to 3 drops of bromine water.

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

**ii**) To about 2cm3 of solution **H** in a test tube, add about 1cm3 of acidified

Potassium dichromate (IV). Warm gently and allow it to stand for a minute.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| (**1mk**) | (**1mks**) |

**iii**) To about 2cm3 of solution **H** in a test tube, add a small amount of solid

Sodium hydrogen carbonate.

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| **Observation** | **Inference** |
| (**1mk**) | (**1mks**) |