**Name……………………………………………………………. Index No……………………………..**

**School…………………………………………………………… Candidate’s sign…………………….**

 **Date………………………………….**

**233/3**

**CHEMISTRY**

**(PRACTICAL)**

**Paper 3**

**2 ¼ hours**

**INSTRUCTIONS TO THE CANDIDATES:-**

**• Write your name 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.**
* **Mathematical tables and electronic calculators may be used.**
* **All working MUST be clearly shown where necessary.**

**• Use the first 15 minutes of the 2 ¼ hours to ascertain you have all the chemical sand**

**apparatus the you may need.**

 **FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAX. SCORE** | **SCORE** |
| **1** | **17** |  |
| **2** | **14** |  |
| **3** | **09** |  |
| **TOTAL** | **40** |  |

***This paper consists of 8 printed pages. Candidates should check the question paper to***

***Ensure that all the pages are printed as indicated and no questions are missing.***

1. You are provided with;

Solution A; (xM hydrochloric acid)

Solution B; (1M Sodium hydroxide solution)

**You are required to:**

• Determine the concentration of the HC1 in moles/litre.

• Determine the molar heat of neutralization of the hydrochloric acid.

**Procedure**

1. Using a clean measuring cylinder measure 50.0cm3 of solution B into a plastic cup/beaker

provided.

2. Measure and record in the table below the temperature of solution B.

3. Fill the burette with solution A.

Note: You are required to add solution A into solution B in portion of exactly 5.0cm3 each.

4. Add the first 5.0cm3 portion of solution A to solution B in the beaker. Stir the mixture with a

thermometer and record the highest temperature attained.

5. Add the other 5.0cm3 portion of solution B, stirring the mixture and record the highest

temperature attained after each addition. Continue until a total volume of 50cm3 has been added.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Volume of solution A added (cm3) | 0.0 | 5.0 | 10.0 | 15.0 | 20.0 | 25.0 | 30.0 | 35.0 | 40.0 | 45.0 | 50.0 |
| Tempetature0C |  |  |  |  |  |  |  |  |  |  |  |

(6mks)

Questions

 (a) Plot a graph of temperature against the volume of a solution A added. (3mks)

![](data:application/x-msmetafile;base64...)

(b) From the graph, determine the volume of solution A that reacted completely with the 50 cm3 of solution B. (lmk)

(c) Calculate the concentration of solution A in moles/litre. (2mks)

(d) From the graph determine the maximum temperature rice when solution B is fully

neutralized. (1mk)

(e) Calculate the molar heat of neutralization of solution A (hydrochloric acid). (4mks)

2. (a) Place all solid R provide into a clean boiling tube then add about 5 cm3 of distilled water.

Shake the contents thoroughly then filter. Retain both the filtrate and residue.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (b) Divide the filtrate into four equal portion. To the first portion, add sodium hydroxide

solution until in excess.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (c) To the second portion, add about 2cm3 of Barium Chloride Solutions.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (d) To the third portion, add 2 or 3 drops of lead II nitrate solution provided followed by about 2cm3 of 2M nitric acid then shake the mixture.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (e) To the fourth portion, add about1cm3 of dilute sulphuric (vi) acid.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (f) (i) Transfer all the residue into a clean boiling tube, then add about 2 cm3 of 2M nitric

 acid add about 5 cm3 of distilled water when all the solid has dissolved.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (ii) Divide the resultant product obtained in f (i) above into three equal portions. Add

 sodium hydroxide solution drop wise until in excess.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (iii) To the second portion, add ammonia solution drop wise until in excess.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (iv) To the third portion, add a few drops of potassium iodide solution.

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

3. You are provided with solid F. Carry out the tests below. Record your observations and inferences

 in the spaces provided.

1. Place about half of solid F on a metallic spatula and burnt it using a non-luminous

|  |  |
| --- | --- |
| Flame |  |
| Observation(1mk) | Inferences(1mk) |

 (b) Place the remaining solid F in a clean boiling tube and add about 10cm3 of water and shake thoroughly.

 i) To about 2cm3 of the solution F, put the universal indicator paper

|  |  |
| --- | --- |
| Provided |  |
| Observation( ½ mk) | Inferences( ½ mk) |

 (ii) To about 2cm3 of solution F, add 2cm3 of acidified potassium dichromate (VI) and

 warm to boiling

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (iii) To about 2cm3 of solution F, add three drops of bromine water

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 (iv) To about 2cm3 of solution F, add three drops of acidified potassium manganate

 (VII) solution; then warm

|  |  |
| --- | --- |
| Observation | Inferences |
| (1mk) | (1mk) |

 END