**Name ....................................................................................................... ADM. .....................................**

FORM 3 CLASS ................................................

**CHEMISTRY**

Paper 3 Date ......................................

**Time : 2¼ Hours**

**CHEMISTRY**

Paper 3

**Time : 2¼ Hours**

**INSTRUCTIONS TO CANDIDATES**

* Answer all questions on the space provided
* All working **Must** be clearly shown

**For Examiner’s Use Only**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate's score** |
| 1 | 17 |  |
| 2 | 13 |  |
| **Total score** | **30** |  |

1. You are provided with;

* Solution A 0.2MNaOH
* Solution B Hydrochloric acid
* Solution C sodium Carbonate solution

You are required to standardize hydrochloric acid using solution A and hence determine the morality in moles per liter of solution C sodium carbonate

**Procedure I**

Using a pipette transfer 25cm3 solution A into conical flask add 2 to 3 drops phenolphthalein indicator then titrate with hydrochloric acid provided in a beaker from burette. Shake the conical flask after each additional and note the volume required to neutralize sodium hydroxide solution. Record your results in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Titre | I | II | III |
| Final burette readings (cm3) |  |  |  |
| Initial burette readings (cm3) |  |  |  |
| Volume of the acid used (cm3) |  |  |  |

1. What is the average volume of solution B? (5mks)

***CT***

**D**

**A±0.1**

**±0.2**½

**PA**

**FA**

**Average = 25.1cm3**

1. Calculate the number of moles of solution B required to complete neutralize solution A. (3mks)

**Moles of NaOH ≡> 25.0 x0. 2**

**1000**

**= 0.005moles**

**Moles of acid, moles ratio 1:1**

**= 0.005 x 1**

**= 0.005moles**

1. Calculate the molarity in moles per liter of solution B hydrochloric acid. (1mk)

**0.005 x 1000**½

**25**

**= 0.2M**½

**Procedure II**

Rinse the pipette thoroughly then pipette 25cm3 of solution C sodium carbonate into clean conical flask then add 2 to 3 drops of phenolphthalein indicator. Refill the burette with solution B and use it to titrate content of the conical flask. Shake the flask after each addition of the acid solution B and note the volume of the acid required to neutralize 25cm3 of sodium carbonate solution C.

Record your results in table below

|  |  |  |  |
| --- | --- | --- | --- |
| Titre |  |  |  |
| Final burette readings (cm3) |  |  |  |
| Initial burette readings |  |  |  |
| Volume of solution B used |  |  |  |

1. Calculate average volume of solution B used. (5mks)

**Volume average** **= 12.5cm3** **CT**

**A±0.1**

**± 0.2½**

**D**

**PA**

**FA**

1. Calculate the number of moles of solution C in 25cm3 of the solution. (2mks)

**Moles of the acid = 12.5 x 0.2**

**1000**

**= 0.0025moles**

**Moles of carbonate, moles ratio 1:2½**

**= 0.0025**

**2= 0.00125moles½**

1. Calculate the molarity of solution C in Mole per liter. (1mk)

**= 0.00125 x 1000**

**25**

**=0.05M**

1. You are provided with solid D. Carry out tests below and record your observation and inferences in the table below.
2. Describe the appearance of sold D. (2mks)

**White/ colorless**

**Crystalline solid**

1. Take a boiling tube, add all solid D and add about 10cm3 of distilled water. Shake the mixture

|  |  |
| --- | --- |
| Observations | Inference |
| **Solid dissolved forming a colorless solution**  (1mk) | **Soluble salt**   **Absences of colored ions**  (1mk) |

1. Divide the solution obtained above into five portions. To the first portion add drops of lead (ii) Nitrate solution.

|  |  |
| --- | --- |
| Observations | Inference |
| **No white precipitate**    (1mk) | **SO42-**  **Cog2-**  **Cl- absent. Each ion½**  **So42-**  (2mk) |

1. To the second portion add 3 drops of barium Nitrate.

|  |  |
| --- | --- |
| Observations | Inference |
| **No white precipitate**    (1mk) | **So32-**  **Co32- absent all 3=**  **So42- 2=½**  **1=0**  (1mk) |

1. To the third portion add few then excess drops of ammonia solution.

|  |  |
| --- | --- |
| Observations | Inference |
| **White precipitate½**  **Insoluble in excess½**  (1mk) | **Pb2+**  **Al3+**  **Mg2+ Present. each ion½**  **Ba2+**  (2mk) |

1. To the fifth portion, add drops of hydrochloric acid then boil the mixture.

|  |  |
| --- | --- |
| Observations | Inference |
| **No effervescence**  **While precipitate that dissolves on boiling **  (2mk) | **Pb2+ present**    (1mk) |

1. Give the formula of the anion acid cation present in substance D.

Cation **Pb2+** (1mk)

Anion **No3-** (1mk)

**Assumption**

The only **soluble salts of lead is lead (iii) Nitrate**