**P525/3**

**CHEMISTRY**

**Paper 3**

**Jul/Aug 2019**

**3 ¼ Hours**

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**MUKONO EXAMINATION COUNCIL**

**Uganda Advanced Certificate of Education**

**CHEMISTRY PRACTICAL**

Paper 3

**3 Hours 15 Minutes**

**INSTRUCTIONS TO CANDIDATES**

* *The paper consists of* ***three (3)*** *compulsory questions.*
* *Answer* ***all*** *questions in the spaces provided.*
* *No additional answer sheets will be provided.*

1. You are provided with the following;

**FA1**, which is an aqueous solution of a diabasic acid, H2X

**FA2,** which is a **0.1M** sodium hydroxide solution.

**Solid Q,** which is a metal carbonate M2CO3 (RFM of Q = 74)

You are required to determine the molar concentration of **FA1** and the percentage of the impurity in Q.

**Procedure A**

1. Using a 10cm3 measuring cylinder transfer exactly **8.5cm3** of **FA1** into a 250cm3 volumetric flask and make up to the mark distilled water. Shake the flask to mix the contents thoroughly. Label the solution **FA3**.
2. Pipette **20.0** or **25.0cm3** of **FA2** into a clean conical flask and add 2-3 drops of phenolphthalein indicator. Titrate the contents with solution FA3 from the burette. Repeat the titration 2-3 times to obtain consistent results. Enter your results in the table below.

**Results**

**Table 1**

Volume of pipette used ....................................................................cm3

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment | 1 | 2 | 3 |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of FA3 used (cm3) |  |  |  |

Titre values used for calculating the average volume of **FA3** used;

.................................................................................................. and .............................................................................

Average volume of **FA3** used

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**Questions**

c) Calculate the concentration in moldm-3 of H2X in

(i) **FA3**

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(ii) **FA1**

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**Procedure B**

1. Weigh accurately about **1.2g** of **Q** and dissolve it in **15cm3** of **FA1** in a beaker. Transfer the solution with washings into **250cm3** volumetric flask and make up to the mark with distilled water. Label the resultant solution **FA4.**
2. Pipette **20.0cm3** or **25.0cm3** of **FA2** into a clean conical flask and add 2-3 drops of phenolphthalein indicator and then titrate with solution **FA4** from the burette. Repeat the titration 2-3 times to obtain consistent results. Enter your results in the table II below.

**Results**

**Table II**

Mass of weighing container + **Q** = ...................................................g

Mass of weighing container = ...................................................g

Mass of **Q** used = ....................................................g

Volume of pipette used .....................................................................cm3

|  |  |  |  |
| --- | --- | --- | --- |
| **Experiment** | **1** | **2** | **3** |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of **FA4** used (cm3) |  |  |  |

Titre values used for calculating the average volume of **FA4** used.

......................................................................................... and ...............................................................................

Average volume of **FA4** used;

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**Questions**

c) Calculate the number of moles of acid that;

(i) did not react with the carbonate.

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d) Determine the;

(i) mass of the carbonate that reacted with the acid.

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(ii) Percentage of the impurity in solid **Q**.

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1. You are provided with substance **Y** which contains two cations and two anions. You are required to identify the cations and anions in **Y**. Carry out the following test on **Y** and record your observations and deductions in the table below. Identify any gas(es) evolved.

|  |  |  |
| --- | --- | --- |
| **Tests** | **Observations** | **Deductions** |
| (a). Heat one spatula endful of **Y** strongly in a dry test tube until there is no further change |  |  |
| (b).To two spatula endfuls of **Y** , add concentrated nitric acid drop wise until the solid just dissolves. To the resultant solution add sodium hydroxide solution drop wise until in excess and filter. Keep both the filtrate and residue |  |  |
| (c). To the filtrate, add dilute nitric acid drop wise until the solution is just acidic. Divide the resultant solution into seven portions |  |  |
| (i)To the first portion of the acidic solution, add sodium hydroxide solution drop wise until in excess |  |  |
| (ii)To the second portion of the acidic solution, add aqueous ammonia drop wise until in excess |  |  |
| (iii)To the third portion of the acidic solution, add 2-3 drops of potassium iodide solution |  |  |
| (iv)Use the fourth portion of the acidic solution to carry out a test of your choice to confirm one of the cations in **Y.**  **..............................................................**  **..............................................................**  **.............................................................**  **...............................................................** |  |  |
| (v)To the fifth portion of the acidic solution, add 3-4 drops of lead (ii) nitrate solution |  |  |
| (vi)To the sixth portion of the acidic solution, add 3-4 drops of barium nitrate solution |  |  |
| (vi)To the seventh portion of the acidic solution, add 3-4 drops of silver nitrate solution followed by excess ammonia solution |  |  |
| (d)Wash the residue and dissolve it in 4cm3 of dilute nitric acid. Divide the resulting solution into three portions |  |  |
| (i) To the first portion add sodium hydroxide solution drop wise until in excess |  |  |
| (ii)To the second portion add aqueous ammonia drop wise until in excess |  |  |
| (iv)Use the third portion of the filtrate to carry out a test of your choice to confirm one of the cations in **Y.**  **Test:**  **...............................................................**  **..............................................................**  **..............................................................**  **..............................................................**  **.............................................................** |  |  |

(e)(i). Cations in **Y:** *..................................................* and ***.........................................***

(ii). Anions in **Y: *............................................*** and ***............................................***

3. You are provided with organic substance **G**. You are required to identify the nature of **G.** Carry out the following test on **G** and record your observations and deductions in the table below.

|  |  |  |
| --- | --- | --- |
| Tests | Observations | Deductions |
| (a)Burn a spatula endful of **G** on a porcelain dish or at the end of a spatula |  |  |
| (b)To 2cm3 of **G** add 3 cm3 of water. Shake vigorously and test with litmus. Divide the mixture into four portions |  |  |
| (i)To the first portion of the solution, add 3-4 drops of sodium carbonate solution |  |  |
| (ii)To the second portion of the solution, add 2-3 drops of iron(iii)chloride solution |  |  |
| (iii) To the third portion of the solution, add 3-4 drops of Brady’s reagent |  |  |
| (iv)To the fourth portion of the solution, add 2-3 drops of potassium dichromate(vi) solution and warm |  |  |
| (c)To 1cm3 of G add 3cm3 of iodine solution followed by sodium hydroxide solution drop wise until the solution is pale yellow. Warm the mixture and allow to stand. |  |  |

(d) Comment on the nature of **G.**

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***End -***