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| **NAME:** |  | **INDEX NO:** |  |
| **SCHOOL:** |  | **SIGNATURE:** |  |

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**Community**

UNNASE MOCK EXAMINATIONS

**P525/3**

**CHEMISTRY**

**(PRACTICAL)**

**Paper 3**

**August, 2019**

**3 ¼ hrs**

***Uganda Advanced Certificate of Education***

**CHEMISTRY PRACTICAL**

**PAPER 3**

**3HOURS 15MINUTES**

**INSTRUCTION TO CANDIDATES:**

* *Answer* ***all*** *questions.*
* *Record your answers on this paper in the* ***spaces provided****.*
* *Mathematical tables, slide rulers and silent non-programmable calculators may be used.*
* *Reference books (i.e. text books, books on qualitative analysis, etc.) should* ***not*** *be used.*
* *Candidates are not allowed to start working with apparatus for the first 15 minutes. This time is to enable candidates to read the question paper and make sure they have all the apparatus and chemicals that they may need.*
* *Where necessary*

**K=39,O=16,S=32,N=14,Fe=56,I=127**

|  |  |  |  |
| --- | --- | --- | --- |
| **For examiners use only** | | | |
| **Q.1** | **Q.2** | **Q.3** | **TOTAL** |
|  |  |  |  |
|  |  |  |  |

1. **You are provided with the following**

**FA1:** which is approximately 0.02M potassium manganate (VII) solution.

**FA2:** which is a solution containing 5.2gdm-3 of a metal persulphate, molecular mass =270.

**FA3:** which is a solution of 2.0M sulphuric acid

**Solid L:** which is diammonium iron(II) sulphate (NH4)2SO4FeSO4 .6H2O

**You are required to standardize FA1, and use it to determine the mole ratio for the reaction between aqueous iron(II) ions and the persulphate ions.**

**THEORY**

In this reaction persulphate ions are reacted with excess iron (II) ions and the

unreacted iron(II) ions titrated with acidified manganate(VII) ions.

**PROCEDURE A**

(a) Weigh accurately about 6.0g of **L**. Dissolve it in 150cm3 of **FA3** and

transfer the solution into a 250cm3 volumetric flask.

Make the solution up to the mark with distilled water and Label it **FA4**.

Pipette 25cm3(or 20 cm3) of **FA4** into a conical flask and titrate with

**FA1** from the burette.

Repeat the titration until you obtain consistent results

1. Record your results in the table below

**Results**

Mass of weighing container + solid **L** ……………………………… (g) (½ mark)

Mass of weighing container alone = ……………………………….. (g) (½ mark)

Mass of solid **L**  = ……………………………………………….. (g) (½ mark)

Volume of pipette used = …………………………………………….. (cm3) (½ mark)

**TABLE I**

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette reading(cm3) |  |  |  |
| Initial burette reading(cm3) |  |  |  |
| Volume of **FA1** used(cm3) |  |  |  |

(4marks)

(ii)Volumes of **FA1 to be** used to calculate average volume =

………………………...............and .............................................(cm3) *(½ mark)*

(iii)Calculate the average volume of **FA1**

……………………………………………....................................... (cm3) (2½ marks)

**Questions**

(a) Calculate the molar concentration of iron (II) ions in **FA4**. (2½ marks)

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(b) Determine the concentration of **FA1** in moldm-3. *(4marks)*

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**PROCEDURE B**

(b) Pipette 25cm3(or 20 cm3) of **FA4** into a conical flask and add 10cm3 of **FA2.** Titrate the mixture with **FA1** from the burette.

Repeat the titration until you obtain consistent results

(i) Record your results in the table below

**Results:**

Volumes of pipette used = …………………………………………… (cm3) *(½ mark)*

**Table II**

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette reading(cm3) |  |  |  |
| Initial burette reading(cm3) |  |  |  |
| Volume of **FA1** used(cm3) |  |  |  |

(4½ marks)

(ii) Volumes of **FA1 to be** used to calculate average volume =

…………………………..............and .......................................... (cm3) *(½mark)*

(iii) Calculate the average volume of **FA1**

……………………………………………......................................(cm3) *(2½marks)*

**Questions:**

b) Calculate the number of moles of:

(i)un-reacted iron(II) ions that reacted with the manganate (VII) ions in FA1 *(2marks)*

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ii) iron(II) ions that reacted with persulphate ions. *(1marks)*

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c) Determine the:

(i) number of moles of metal persulphate that reacted. *(1marks)*

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(ii) reaction mole ratio between metal persulphate and iron(II) ions. *(1mark)*

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1. You are provided with substance **Q** which contains **three** cations and **one** anion. Carry out the following tests to identify the cations and anion in **Q**. Record your observations and deductions in the table below. Where a gas(es) is /are evolved must be identified. *(30marks)*

|  |  |  |
| --- | --- | --- |
| **TESTS** | **OBSERVATIONS** | **DEDUCTIONS** |
| (a) To **one** spatula end ful of **Q** add 5 drops of concentrated sulphuric acid and heat. |  |  |
| (b) To **two** spatula end fuls of **Q** in the test tube add about 10cm3 of water and shake strongly, warm and then filter. Keep both the filtrate and residue.  Divide the filtrate into **six** parts. |  |  |
| (i) To the **first** part add dilute sodium solution hydroxide drop-wise until in excess. |  |  |
| (ii) To the **second** part add  aqueous ammonia solution drop-wise until in excess. |  |  |
| (iii) To the **third** part add  0.5cm3 of ammonium oxalate solution followed by dilute ethanoic acid. |  |  |
| (iv) Use the **fourth** part to carry out a test of your own to confirm the cation in the filtrate.  **Test:** |  |  |
| (v) To the **fifth** part add about 1cm3 of dilute sodium hydroxide solution followed  by half spatula of zinc  powder and heat |  |  |
| (vi) To the **sixth** part add half spatula of copper turnings followed by 5drops of concentrated  sulphuric acid and heat. |  |  |
| c) Wash the residue with and water then dissolve  it in about 10cm3 of dilute nitric acid.  To half of the resultant solution in a boiling tube add dilute sodium hydroxide solution drop-wise untill no further change.  Then filter and keep both the filtrate and residue. |  |  |
| d) To the filtrate add dilute nitric acid to acidify the solution. Divide the resultant solution into **three** portions. |  |  |
| (i) To the **first** portion of acidified solution add dilute sodium hydroxide solution drop-wise until in excess. |  |  |
| (ii) To the **second** portion of acidified solution add aqueous ammonia solution drop-wise until in excess. |  |  |
| 1. To the **third** portion of acidified solution add 2-3 drops potassium iodide solution followed by dilute sodium hydroxide solution. |  |  |
| (e) Dissolve the residue in part (c) in minimum dilute nitric acid and divide the solution into **four** parts |  |  |
| (i) To the **first** part add aqueous sodium hydroxide solution drop-wise until in excess. |  |  |
| (ii) To the **second** part add aqueous ammonia solution drop-wise until in excess. |  |  |
| (iii) To the **third** part add  2-3 drops ammonium oxalate solution. |  |  |
| (iv) To the **fourth** part add half spatula end-ful of ammonium chloride followed by about 1cm3 of concentrated solution of disodium hydrogen phosphate then ammonia solution drop-wise until in excess. |  |  |

f) Identify the cations and anion in **Q.**

Cations: ………………………………………………………………………………………

Anion: …………………………………………………………………………………………

1. You are provided with substance **T** which is an organic compound. You are required to determine the nature of **T**. Carry out the following tests on **T** and record your observations and deductions in the table below**.** *(20marks)*

|  |  |  |
| --- | --- | --- |
| **TESTS** | **OBSERVATIONS** | **DEDUCTIONS** |
| (a) Burn a small amount of **T** on a spatula end or in a porcelain dish. |  |  |
| (b) Shake 0.5cm3 of **T** with about 1cm3 of water and then test the solution with litmus paper |  |  |
| c) To about 0.5cm3 of T add drops of iron(III) chloride solution |  |  |
| d) To about 0.5cm3 of **T** add few drops bromine water and shake |  |  |
| e) To about 0.5cm3 of **T** add drops of acidified potassium  dichromate (VI) solution and heat |  |  |
| f) To about 0.5cm3 of **T** add lucas reagent. |  |  |
| g) To about 0.5cm3 of **T** add drops of 2,4- dinitrophenyl hydrazine solution. |  |  |
| g) Dissolve about 0.5cm3 of **T** in about 1cm3 of methanol. To the resultant solution add iodine solution followed by dilute sodium hydroxide solution drop-wise until the brown solution of iodine is just discharged. Heat and cool then allow to cool. |  |  |
| h) To about 0.5cm3 of **T**  add 5 drops of concentrated sulphuric acid followed by concentrated solution of sodium hydrogen sulphite and shake strongly |  |  |

1. Comment on the nature of **T.**

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**\*\*\*\* END \*\*\*\***