Candidate’s Name:…………………………..………………............................. Index No: ……………......

Signature…………………………. School ……………………………………………………………

P525/3

CHEMISTRY

Paper 3

July/August, 2019

3¼ hours

*BUGANDA EXAMINATION COUNCIL MOCKS – 2019*

*CHEMISTRY*

*PRACTICAL*

*Paper 3*

*3 hours 15minutes*

**INSTRUCTIONS TO CANDIDATES**

* *Answer* ***ALL*** *questions. Use* ***blue*** *or* ***black*** *ball point pen. Any work done in pencil will* ***not*** *be marked except drawings.*
* *Record your answers on this question paper in the spaces provided.*
* *Mathematical tables 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 the 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.*

|  |  |  |  |
| --- | --- | --- | --- |
| **For Examiners’ Use Only** | | | |
| **Q.1** | **Q.2** | **Q.3** | **Total** |
|  |  |  |  |
|  |  |  |  |

**Turn Over**

1. You are provided with the following;

**FA1**; which is a solution containing of iron(II) ions.

**FA2**; which is a solution of potassium manganate(VII) of unknown concentration.

Solid **R**, which is a salt containing persulphate ions.

1 M sulphuric acid solution.

You are required to standardize **FA2** and use it to determine the reaction ratio between iron(II) ions in **FA1** and solid **R**.

In acidic medium, potassium manganate(VII) reacts with iron(II) ions in the ratio of

**PROCEDURE:**

1. Pipette 25.0 (or 20.0) cm3 of **FA1** into a conical flask and add 20 cm3 of 1 M sulphuric acid using a clean measuring cylinder.

Shake the mixture and titrate the mixture with **FA2**.

Repeat the titration until you obtain consistent results.

1. Record your results in the **Table I** below.

**RESULTS:**

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

**Table I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Experiment** | **1** | **2** | **3** |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume **FA2** used (cm3) |  |  |  |

(4½ marks)

1. Volumes of **FA2** used for calculating the average volume. (½ mark)

……………………………………………………………………………………

1. Average volume of **FA2** used ………………………...........…………cm3

(2½ marks)

**Questions**:

1. Calculate the molar concentration of potassium manganate(VII) in **FA2**.

() (4½ marks)

………………………………………………………………………………………....…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………....

**PROCEDURE:**

1. Weigh accurately about 0.5 g of **R**. Add about 50 cm3 of distilled water, carefully shake to dissolve and transfer the solution into a 250 cm3 volumetric flask. Using a clean measuring cylinder, add exactly 150 cm3 of **FA1** to the solution in the volumetric flask. Make the solution up to the mark with distilled water, shake well and label it **FA3**.

Pipette 25.0 (or 20.0) cm3 of **FA3** into a conical flask add 10 cm3 of 1 M sulphuric acid using a measuring cylinder.

Shake the mixture and titrate the mixture with **FA2**.

Repeat the titration until you obtain consistent results.

1. Record your results in the **Table II** below.

**RESULTS**:

Mass of weighing container + **R** = ........................................... g (½ mark)

Mass of empty weighing bottle =............................................. g (½ mark)

Mass of **R** used = ............................................g (½ mark)

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

**Table II**

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of **FA2** used (cm3) |  |  |  |

(4½ marks)

1. Volumes of **FA2** used for calculating the average volume ...........……………………………………………… cm3  (½ mark)
2. Average volume of **FA2** used………………………………… cm3

(2½ marks)

**Questions**

1. Calculate the number of moles of

(v) iron(II) ions that reacted manganate(VII) ions in **FA2**. (2½ marks)

........................................................................................................................................................................................................................................................................………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. iron(II) ions in 250 cm3 of **FA3.** (1½ marks)

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

1. iron(II) ions that reacted with solid **R**. (02 marks)

……………………………………………………………………………………………………

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….……………………………………………………………………………………………………………………………………………………………………

1. Determine the reaction ratio between iron(II) ions in **FA1** and solid **R**.

(*RFM of R= 270*) (02 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….……………………………………………………………………………………………………………………………………………………………………………….……………………………………………………………………………………………………………………………………………………………………………………..

1. You are provided with substance **Z,** which contains **two** cations and **two** anions. You are required to carry out tests below on **Z** and identify the cations and anions in **Z**.

Identify any gas(es) evolved.

Record your observations and deductions in the table below. (*32 marks*)

|  |  |  |
| --- | --- | --- |
| **TESTS** | **OBSERVATIONS** | **DEDUCTIONS** |
| 1. Heat **two** spatula end- fuls of **Z** strongly in a dry test tube until there is no further change. |  |  |
| 1. To about 6 cm3 of water, add 2 spatula end-fuls of **Z** and shake well.   Filter the mixture and keep both filtrate and residue. |  |  |
| 1. Divide the filtrate into **five** parts. 2. To the **first** part of the filtrate, add dilute sodium hydroxide solution dropwise until in excess. |  |  |
| 1. To the **second** part of the filtrate, add dilute ammonia solution dropwise until in excess. |  |  |
| 1. Use the **third** part of the filtrate, to carry out a test of your own choice so as to confirm the **first** cation in **Z**. |  |  |
| 1. To the **fourth** part of the filtrate, add 2-3 drops of lead(II) nitrate solution and heat the mixture. |  |  |
| 1. Use the **fifth** part of the filtrate, to carry out a test of your own choice so as to confirm the **first** anion in **Z**. |  |  |
| 1. Wash the residue from (b) with distilled water and then add dilute hydrochloric acid until there is no further change. Divide the acidic solution into **three** parts. |  |  |
| 1. To the **first** part of the acidic solution, add dilute sodium hydroxide solution drop wise until in excess. |  |  |
| 1. To the **second** part of the acidic solution, add dilute ammonia solution drop wise until in excess. |  |  |
| 1. Use the **third** part of the acidic solution, to carry out a test of your own choice so as to confirm the **second** cation in **Z**. |  |  |

**Questions:**

1. Identify the

(i) cations in **Z** …………………………...........…………………………….

(ii) anions in **Z** ………………………............................................................

1. You are provided with an organic compound **W**.

You are required to carry out tests below on **W** and describe the nature of **W**. Record your observations and deductions in the table below. (*18 marks*)

|  |  |  |
| --- | --- | --- |
| **Tests** | **Observations** | **Deductions** |
| 1. Burn a small amount of **W** on a spatula end or in a dry porcelain dish. |  |  |
| 1. To about 1 cm3 of **W**, add 2 cm3 of water, shake and test with a litmus paper.   Divide the mixture into **three** parts. |  |  |
| 1. To the **first** part of the mixture, add 3-4 drops of sodium hydrogencarbonate solution. |  |  |
| 1. To the **second** part of the mixture, add 4-5 drops of neutral iron(III) chloride solution. |  |  |
| 1. To the **third** part of the mixture add 3-4 drops of 2,4-dinitrophenylhydrazine |  |  |
| 1. To about 0.5 cm3 of **W**, add about 1 cm3 of acidified potassium dichromate(VI) solution. Then add 5 drops of 2,4-dinitrophenylhydrazine and shake. Leave it stand for about 1 minute. |  |  |
| 1. To about 0.5 cm3 of **W**, add about 1 cm3 of ethanoic acid followed by 2-3 drops of concentrated sulphuric acid. Heat the mixture and the pour in a small beaker of cold water. |  |  |
| 1. To about 0.5 cm3 of **W**, add 4 drops of Lucas reagent. |  |  |
| 1. To about 0.5 cm3 of **W**, add 4 cm3 of iodine solution followed by sodium hydroxide solution until the solution is pale yellow. Warm the mixture gently and allow it to cool under cold water. |  |  |

1. Describe the nature of **W**.

............................................................................................................................................................................................................................................................................................................

**END**