Name..........................................................................Center/Index number............/..........

P525/3

CHEMISTRY

Paper 3

August, 2019

3¼ hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS –AUGUST, 2019

CHEMISTRY

PRACTICAL

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

* Answer all questions.
* Answers are to be written in the spaces provided.
* You are not allowed to use any reference books.
* Mathematical tables, slide rulers and non-programmable silent electronic calculators may be used.
* Candidates are not allowed to start working with the apparatus for the first 15 minutes. This time is to ensure that they have all the chemicals and apparatus they may need.
* *Atomic masses: C=12, O=16, H=1, N=14, Cl=35.5*

For Examiner’s Use Only

|  |  |  |  |
| --- | --- | --- | --- |
| Q1 | Q2 | Q3 | TOTAL |
|  |  |  |  |
|  |  |  |  |

1. You are provided with the following:

**FA1** which is an aqueous solution of a dibasic acid, .

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

**Solid**, **P,** which is a metal carbonate, .

*You are required to determine the concentration in of in* ***FA1*** *and then work out the value of* ***M****in.*

**Procedure A:**

1. Using a10cm3 measuring cylinder, transfer exactly 3.5cm3 of **FA1**into a100cm3

measuring cylinder and then add distilled water carefully up to the mark. Label this

solution **FA3**.

1. Pipette 25cm3 (or 20cm3) of **FA2** into a clean conical flask and add 2 –3 drops of

Phenolphthalein indicator. Titrate the contents with the solution **FA3** from the burette.

1. Repeat the titration 2 – 3 times until you obtain consistent results.

Enter your results in the table 1 below.

**Results:**

Volume of pipette used……………………………………………….…...... (0½ mark)

**Table I**

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading(cm3) |  |  |  |
| Volume of **FA3** used (cm3) |  |  |  |

Titre values used for calculating average volume of **FA3** used are ….………………….…

…………..………………………… ………………………………………… (0½ mark)

Average volume of **FA3**used …………………….……..………………...… (2½ marks)

**Questions:**

1. Calculate the concentration in of in;
2. **FA3** (03 marks)

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1. **FA1** (03 marks)

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**Procedure B:**

1. Weigh accurately about 2.5g of **P**and dissolve it in 15cm3of **FA1** in a beaker.Transfer the

solution with washings into a 100cm3 measuring cylinder. After effervescence has stopped,

add water to the contents in the measuring cylinder and make up to the mark. Label this

solution **FA4**.

1. Pipette 25cm3(or 20cm3)of **FA2** into a clean conical flask, add 2 –3 drops of Phenolphthalein

indicator and then titrate with the solution**FA4** from the burette.

1. Repeat the titration 2 – 3 times to obtain consistent results.

Enter your results in the table **II** below.

**Results**

Mass of empty container + **P** = ……………….…………………………………g (0½ mark)

Mass of empty container alone = ……………...……..…………………………....g (0½ mark)

Mass of **P**  used = …………………..……………………………..g (0½ mark)

Volume of pipette used…………………………….………….…………………. (0½ mark)

**Table II** (4½ marks)

|  |  |  |  |
| --- | --- | --- | --- |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading(cm3) |  |  |  |
| Volume of **FA4** used (cm3) |  |  |  |

Titre values used to calculateaverage volume of **FA4**used are …………………….……………

………………..…………………………………………………………..….....…… (0½ mark)

Average volume of **FA4** used……………………………………...……….…….. (2½ marks)

**Questions**:

1. Calculate the number of moles of acid that:
2. did not react with the carbonate. (02 marks)

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1. reacted with the carbonate. (1½ marks)

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1. Calculate the molar mass of**P** and hence determine the value of **M**in . [***C = 12, O = 16***]

(03 marks)

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1. You are provided with substancewhich contains **two cations** and **two anions**. You are required to identify the cations and anions in **Y.** Carry out the following tests on **Y** and record your observations and deductions in the table below**.** Where gas(es) is (are) evolved, it must be identified. ***(32 marks)***

|  |  |  |
| --- | --- | --- |
| ***TESTS*** | ***OBSERVATIONS*** | ***DEDUCTIONS*** |
| **(a)**Heat two spatula end-fuls of **Y**in  a hard test tube first gently and  then strongly until there is no  further change. |  |  |
| **(b)**To onespatula end-ful of **Y**in a  test tube, add 3 – 4 drops of  concentrated sulphuric acid and  heat gently. |  |  |
| **(c**) To two spatula end-fuls of **Y** in a  boiling tube, add about 3cm3of  water and shake vigorously.  Filter and keep both the filtrate  and residue.  **Divide the filtrate into five**  **portions.** |  |  |
| 1. To the **first** portion of the filtrate, add dilute solution of sodium hydroxide drop-wise until in excess. |  |  |
| 1. To the **second** portionof the filtrate, add dilute ammonia solution drop-wise until in excess. |  |  |
| 1. To the **third** portion of the filtrate, add 3 – 4 drops of dilute sulphuric acid. |  |  |
| 1. To the **fourth** portion of the filtrate, add3 – 4 drops of dilute nitric acid followed by 3 – 4 drops of the litmus solution. Then add ammonia solution drop-wise until in excess. |  |  |
| (d) To the **fifth** portion of the  filtrate, add an equal volume  of Barium nitrate solution then  followed by 2 – 3 drops of  dilute nitric acid. Shake and  filter.  **Divide the filtrate into two**  **parts**. |  |  |
| 1. To the **first** part of the filtrate in **(d)**,add 3 – 4 drops of silver nitrate solution then followed by dilute ammonia solution drop-wise until in excess. . |  |  |
| 1. To the **second** part of the acidic filtrate in (d), add 2 – 3 drops of concentrated nitric acid then followed by 4 drops of starch. |  |  |
| (e) Wash the residue from **(c)**.  Then add dilute sulphuric  acid to it 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 to confirm** one of the cations in **Y**. |  |  |

(f) Identify the;

1. cations in **Y**...….…………………………and ………….……….……………………
2. anions in **Y**..……………………………. .and………...………………………………
3. You are provided with an organic compound **Z**. You are required to determine the nature of **Z**. Carry out the following tests on **Z** and record your observations and deductions in the table below. ***(18 marks)***

|  |  |  |
| --- | --- | --- |
| ***TESTS*** | ***OBSERVATIONS*** | ***DEDUCTIONS*** |
| **(a)** Burn a small amount of **Z** at a  spatula end or on a Porcelain  dish. |  |  |
| **(b)** To about 2cm3 of **Z** in a test tube,  add about 2cm3 of water and  shake. Then test with litmus  paper.  **Divide the resultant mixture**  **into three portions.** |  |  |
| 1. To the **first** portion, add   3– 4 drops of the neutral  Iron (III) chloride solution. |  |  |
| 1. To the **second** portion, add 4–5 drops of the solution of sodium carbonate. |  |  |
| 1. To the **third** portion, add   3 – 4 drops of Brady’s reagent. |  |  |
| **(c)**To about 1cm3 of **Z** in a test tube,  add 3 – 4 drops of concentrated  sulphuric acid followed by 1cm3  of ethanol. Heat the mixture and  pour the contents into a small  beaker containing cold water.  Allow it to stand for some time. |  |  |
| **(d)** To about 0.5cm3 of **Z** in a test  tube, add 1cm3 of the acidified  potassium dichromate solution  and heat. |  |  |
| **(e)**To about 1cm3 of silver nitrate,  add 1cm3 of sodium hydroxide  solution. Then add dilute ammonia  solution drop-wise until the  precipitate formed just dissolves.  Then add 1cm3 of **Z** and boil the  mixture for about five minutes.  Leave to stand. |  |  |

Comment on the **nature** of  **Z.** ………………………………………………………………………………………………...…………...…………………………………………………………………………………………………………....