NAME: …………………………………………….…………………ADM No ………… CLASS ……

233/3

**CHEMISTRY**

**PRACTICAL**

Paper 3

FORM 4

JUNE 2022

**Time: 2 ½ Hours**

**END-TERM EXAMINATION**

## Instructions to candidates

*- You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.*

*- All working MUST be clearly shown.*

*- Mathematical tables and electronic calculators may be used.*

1. You are provided with:

 - 0.1m sodium hydroxide solution F

 - Solution G made by dissolving 9.0g of dibasic acid H2MO4 in 250cm3 of distilled water

You are required to:

1. Dilute solution G
2. Standardize the diluted solution H using the sodium hydroxide solution F
3. Determine the mass of M in the formula H2MO4

**Procedure 1**

Using a measuring cylinder measure 20cm3 of solution G and transfer it into a beaker.

Measure 80cm3 of distilled water and add it to the 20cm3 of solution G in the beaker. Label this as solution H.

**Procedure II**

Place solution H in a burette. Pipette 25cm3 of solution F into 250cm3 conical flask. Add 2 – 3 drops of phenolphthalein indicator and Titrate with solution H. Record your results in table 1. Repeat the titration two more times and complete the table.

a) Table 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | **1** | **II** | **III** |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution H used (cm3) |  |  |  |

 ( 4 marks)

b) Calculate the average volume of solution H used. ( 1 mark)

1. Determine the number of moles of:-

I Sodium hydroxide in Solution F in 25cm3 ( 1 mark)

II Acid in solution H in the average volume used. ( 1 marks)

III acid in 100cm3 of solution H. ( 1 marks)

IV acid in 20cm3 of solution G. ( 1 mark)

V acid in 250cm3 of solution G ( 2 marks)

1. Calculate the:

I Molar mass of acid H2MO4 ( 2 marks)

II Mass of M in the formula H2MO4 given that H = 1, O=16. ( 1 marks)

2. You are provided with:

 - 0.15M ethan-1,2-dioc acid (oxalic), solution M

 - 0.02M acidified potassium manganate (VII) solution N

You are required to determine the rate of reaction between acidified potassium manganate (VII) and ethan – 1,2 – dioc (oxalic) acid at different temperatures.

**Procedure**

1. Place 5cm3 of solution N in a boiling tube
2. Place another 5cm3 of solution M in another boiling tube.
3. Heat solution N on a Bunsen burner flame to 800C. Allow it to cool to 700C.
4. Add all solution M into solution N and at the same time start the stop watch
5. Stir the mixture and record in table II the time taken for purple colour to disappear. At the same time record the temperature.
6. Using clean boiling tubes repeat the procedure while allowing solution N to cool to 600, 500C and 450C in each case to complete table II below.
7. **Table II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Temperature before mixing oC** | **70** | **60** | **50** | **45** |
| Temperature at which purple colour disappear 0C |  |  |  |  |
| Time taken for purple colour to disappear |  |  |  |  |
| 1/time sec |  |  |  |  |

 ( 4 marks)

b) On the grid of graph paper provided plot 1/time ( y-axis) against temperature at which the purple colour disappears. ( 3 marks)

b) From your graph;

 I. determine the time taken for purple colour to disappear at 47.50C. ( 1 marks)

II State the relationship between rate of reaction and the temperature at which purple colour disappears. ( 1 mark)

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**3. a)**You are provided with substance ***P*** for this question. ***Transfer*** the substance into a clean boiling tube. ***Add*** about 10cm3 of distilled water and ***stir***. ***Pour*** the mixture into ***four*** clean test tubes of about 2cm3 each.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| 1mk | 1mk |

1. To the ***first*** portion of the solution, ***add*** sodium hydroxide solution dropwise ***until*** in excess.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| 1mk | 1mk |

1. ***Dip*** a clean stirring rod/glass rod/nichrome wire into the second portion and then ***place*** into the side of a blue bunsen flame.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| ½ mk | 1mk |

1. To the ***third*** portion, ***add*** 2-3 drops of barium nitrate solution ***followed by excess*** hydrochloric acid.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| 1mk | ½ mk |

1. To the ***fourth*** portion, ***add*** 2-3 drops of acidified potassium manganate (VII)

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| ½ mk | 1mk |

1. You are provided with solid K. Carry out the tests below. Write your observations and inferences in the spaces provided.
2. Using a clean metallic spatula, heat about one third of solid K in a Bunsen burner flame.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| (1mk) | ( 1mark) |

1. Dissolve the remaining portion of solid K into about 10cm3 of distilled water and divide the solution into 4 portions.

To the first portion, add two drops of acidified potassium permanganate solution.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| (1mark) | ( 1 mark) |

1. To the second portion, add two drops of bromine water.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| (1mark) | (1mark) |

1. Determine the pH of the third portion using universal indicator paper.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| ( ½ mk) | ( ½ mk) |

1. To the fourth portion, add a small amount of solid sodium hydrogen carbonate.

|  |  |
| --- | --- |
| ***Observations*** | ***Inferences*** |
| (1mark) | (1mark) |

**END**