**MARKING SCHEME**

**BUNAMFAN CLUSTER EXAMINATION 2022**

**END OT TERM ONE 2022**

**233/3**

**CHEMISTRY**

**PAPER THREE(PRACTICAL)**

**JUNE 2022**

2 HOURS 15 MINUTES

**QUESTION 1.**

**PROCEDURE I**

**TABLE 1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Titration** | **I** | **II** | **III** |
| Final burette reading, cm3 |  |  |  |
| Initial burette reading, cm3 |  |  |  |
| Volume of solution M used, cm3 |  |  |  |

 (4 marks)

Complete table……………… 1mk or ½ mk or 0

Decimal…………………….. 1mk or 0

Accuracy…………………….1 mk or ½ mk or 0

Principles of averaging………1 mk or ½ mk or 0

Final accuracy……………… 1 mk or ½ mk or 0

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

V = a +b+c/3 or a+b/2 or b+c/2

Working…………………….1/2 mk

Correct ans………………….1/2 mk

Correct to atleast 2dp unless exactly to 1dp or whole no.

1. Concentration (1 mark)

23.5/392 = 0.06M

Ans should be exact otherwise penalize ½ mk/

1. Calculate number of moles of solution Fe2+ in 25 cm3. (1 mark)

 25 x 0.06/1000 = 0.0026 moles

 Ans in 4dp otherwise penalize ½ mk for rounding off.

1. The concentration 1 marks)

Mole ratio 5:1

Moles in c x 5 = ans

Ans x1000/ av volume

= final ans

PROCEDURE II

1. Calculate the average volume of solution A used in table II.. (1 mark)

 AS IN TABLE 1

1. Calculate the number of moles of manganate (VII) ions in table II above. (1 mk)

 Ans in (d) av volume table 2 / 1000

 = correct ans.

1. Given that 2 moles of of manganate (VII) ions react with 5 moles of the dibasic acid C, calculate the number of moles of the dibasic acid used in moles per litre. (1 mk)

Mole ratio = 2:5,

Moles of dibasic acid= Ans in (f) x 5/2

= ans

Molarity = ans x 1000/25

=correct ans

1. Calculate the:
2. Formula mass of the dibasic acid, solution C.(H = 1.0, O = 16.0) (1 mk)

5/ ans in (g)

Correct ans .

Ans can be whole number or DP

1. Formula mass of X in the dibasic acid C.(1 mk)

 Ans in h(I) = 2+x+2(18)

 X = Ans in h(I) - 38

 = Correct ans.

 ANS BETWEEN 80-90 otherwise penalize ½ mk

 Ans can be whole number or dp.

**QUESTION 2**

You are provided with solid M. carry out the tests and write your observations and inferences in the spaces provided.

1. Describe the appearance of solid M. (1 mark)

|  |
| --- |
| **Appearance**  |
| White solid/white powder/white crystal1. mark)
 |

1. Place the solid M in a boiling tube. Add about 12cm3of distilled water and Shake well. Divide the solution into five portions and carry out the tests below.
2. To the first portion, dip both red and blue litmus paper.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| Blue litmus changes red…. ½ mkRed litmus paper remain red…1/2 mk(1 mark) | Acidic solution.(1 mark) |

1. To the second portion, add sodium hydroxide solution dropwise until in excess.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| White ppt that dissolves in excess to form a colourless solution(1 mark) | Zn2+/Al3+/Pb2+(1 mark) |

1. To the third portion, add aqueous ammonia dropwise until in excess.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| White ppt that is insoluble(1 mark) | Al3+/Pb2+(1 mark) |

1. To the fourth portion, add three drops of sodium chloride solution.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| No white ppt(1 mark) | Al3+ present… 1 mk Award 1/2mk for Pb2+ absent if Al3+ is not inferred.(1 mark) |

1. To the fifth portion, add two drops of barium nitrate followed by five drops of nitric(V) acid.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| White ppt…..1/2 mkNo effervescence….1/2 mk(1 mark) | SO4 2- present.Award ½ mk for SO32- and CO32- ABSENT if SO4 2- is not binferred.(1 mark) |

1. You are provided with solid P. Carry out the following tests and record your observations and inferences in the spaces provided.
2. Place about one third of the solid P on a clean metallic spatula and ignite using a Bunsen burner.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| Melts to a colourless liquid that burns with yellow sooty flame(1 mark) | =C=C= ……1 mkOr triple bond structure..1. mark)
 |

1. Place the remaining solid P in a boiling tube. Add about 10cm3of distilled water and Shake well.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| Dissolves to form a colourless solution( 1/2 mark) | Polar/ soluble substance(1/2 mark) |

1. Divide the mixture into three portions.
2. To the first portion add two drops of acidified potassium manganate(VII).

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| Purple potassium manganate(VII) solution changes colourless/ decolourised.(1 mark) | =C=C= ……1/2 mk or triple bond structure.ROH …..1/2 mk |

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

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| Orange bromine water changes colourless/ decolourised.(1 mark) | =C=C= OR TRIPLE BOND STRUCTURE. (1 mark) |

1. To the third portion, describe the procedure you can use to determine the PH using the reagents given.

|  |
| --- |
| **Procedure:** |
| To the solution add few drops of universal indicator solution.Match colour with PH chart to get corresponding PH.(1 mark) |

1. Carry out your procedure in (iii) to determine the PH.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| PH= 4 or 5 or 6 ………1 mkReject range of PH eg PH 4-6(1 mark) | Weakly acidic.(1 mark) |