**MID TERM SERIES-TERM 1-2023**

**CHEMISTRY PAPER 3 (233/3)**

 **FORM FOUR (4)**

 **TIME: 2 1/2 HOURS**

 **MARKING SCHEME**

1. Table 1.

|  |  |  |
| --- | --- | --- |
| Temperature(0C) | Time(Sec) | Reciprocal |
| Room | 30 | 0.0333 |
| 30 | 23 | 0.0435 |
| 35 | 18 | 0.0556 |
| 40 | 14 | 0.0714 |
| 45 | 11 | 0.0909 |
| 50 | 9 | 0.1111 |
| 55 | 8 | 0.125 |
| 60 | 5 | 0.1613 |

* Complete table(Time in secs and ) (3marks)
* Decimal consistency (1 mark)
* Accuracy against school value(room temperature) (1 mark)
* Trend (showing in time) (1 mark)
* Graph
* Scale ½ mark (3/4 of graph provided)
* Labelling (½ mark)
* Plots (1 mark)
* Line (1 mark)



b) As the temperature increases, the rate of reaction between sodium thiosulphate and dilute hydrochloric acid increases✓ (1 mark)

c) i) ✓ ½ =5.8826 sec ✓ ½

 ii) Temperature=34.50C (1 mark)

Table II

|  |  |  |
| --- | --- | --- |
| I | II | III |
| Final Burette Reading | 24.0 | 48.0 | 34.0 |
| Initial Burette Reading | 0.0 | 24.0 | 10.0 |
| Volume of Solution | 24.0 | 24.0 | 24.0 |

* **COMPLETE TABLE** (1 MARK)

-penalise1/2 a mark for inversion,wrong arithmetics,incomplete table

* **DECIMAL CONSISTENCY** (1 MARK)

-decimals MUST be consistent either 1d.p OR 2 d.p where 2nd is 0 OR 5

* **ACCURACY AGAINST SCHOOL VALUE** (1MARK)

-If within 0.1 **(1mark),** 0.2 **(1/2 mark**), Outside that range (**0 mark)**

* **PRINCIPLE OF AVERAGING** (1MARK)

-Titre values to be average should be within **+/-0.2** of each other and **must** be shown,otherwise award **zero mark**

* **FINAL ANSWER** (1 MARK)

-candidate average titre value compared to average school value: If within+/- 0.1(1mark), +/-0.2 (1/2 a mark)

d) i) principle average

 ✓ =24.0 ✓

 ii) 2 moles=1000 cm3

 ✓ ½ =0.025 moles ✓ ½

 0.025 moles in 250 cm3

 In 24.0 cm3 we have

 ✓ ½ =0.0024 moles of HCL ✓ ½

 iii) Moles of C

 ✓ ½ =0.0025 ✓ ½ moles of alkali used

 iv) Reaction mole ratio of

 Acid Alkali

 0.0024=1✓ ½ 0.0025 =1✓ ½

 0.0024 0.0024

 1:1 ✓ ½

 v) Ionic equation

 H+(aq)+OH-(aq)  H2O(l) ✓ 1

2. a)

|  |  |
| --- | --- |
| Observation | Inferences |
| No white precipitate ✓ 1 | * ABSENCE OF Ca2+,Mg2+,Al3+,Pb2+,Zn2+
* ANY 4 OR 5 IONS 1MRK
* ANY 3 OR 2 IONS ½ mark
* ANY 1 ZERO MRK
* NOTE: penalize ½ a mrk for any contradictory ion
 |

b)

|  |  |
| --- | --- |
| Observation | Inferences |
| * White precipitate ✓ 1
 | PRESENCES OF CO32-,SO42-,SO32--ANY 3 IONS✓ 1-ANY 2 IONS✓ ½-ANY 1 ION (0MRK)* NOTE; penalize ½ a mark for any contradictory ion
 |

c)

|  |  |
| --- | --- |
| Observation | Inferences |
| * WHITE PRECIPITATE✓ ½
* DISSOLVES IN NITRIC ACID ✓ 1/2
 | * PRESENCES OF CO32-✓ ½
* ,SO32-✓ ½

NOTE: penalize 1/2 a mark for any contradictory ion |

d)

|  |  |
| --- | --- |
| Observation | Inferences |
| * PURPLE COLOUR OF ACIDIFIED POTASSIUM MANGANATE(VII) IS DICOLOURISED/TURN TO COLOURLESS✓ 1
 | SO32- PRESENT✓ 1 -Award zero mark for any contradictory ion  |

e)(i)

|  |  |
| --- | --- |
| Observation | Inferences |
| * WHITE PRECIPITATE SOLUBLE IN EXCESS✓ 1/2
 | * -PRESENCES OF Al3+,Zn2+, Pb2+ ✓ 1/2

-penalise ½ for any contradictory ion |

(ii)

|  |  |
| --- | --- |
| Observation | Inferences |
| * WHITE PRECIPITATE INSOLUBLE IN EXCESS✓ 1/2
 | * Al3+,Pb2+ PRESENT✓ 1/2

-penalise ½ for any contradictory ion  |

(iii)

|  |  |
| --- | --- |
| Observation | Inferences |
| * YELLOW PRECIPITATE FORMED✓ 1/2
 | * -Pb2+ PRESENT✓ 1/2

-Award zero mark for any contradictory ion  |

 3.(a)

|  |  |
| --- | --- |
| Observation | Inferences |
| * PURPLE COLOUR OF KMnO4 IS DECOLOURISED✓ 1
 | * LONG CHAIN CARBON COMPOUND ✓ 1

OR* UNSATURATED ORGANIC CPD **/** -CC- or

PPRESENT  |

 b)

|  |  |
| --- | --- |
| Observation | Inferences |
|  BROMINE WATER IS DECOLOURISED✓1  |  * -CC- or ✓ 1

PPRESENT  |

 c)

|  |  |
| --- | --- |
| Observation | Inferences |
| * BUBBLES/EFFERVESCENCES PRODUCED✓ 1
 | H+,H3O+ or R-COOH/ -COOH present ✓ 1-PENALISE FULLY FOR ANY CONTRADICTORY ION |

 d)

|  |  |
| --- | --- |
| Observation | Inferences |
| pH 1 OR 2 ✓ 1 | STRONGLY ACIDIC✓ 1 |