**PAVEMENT FORM 4 EXAMINATION 2022**

**Kenya certificate of secondary education (K.C.S.E)**

**OPENER EXAM**

**CHEMISTRY**

**MARKING SCHEME**

TABLE I

|  |  |  |  |
| --- | --- | --- | --- |
|  | **I** | **II** | **III** |
| Final burette reading (cm3) | 25.0 | 25.0 | 35.0 |
| Initial burette reading (cm3) | 0.0 | 0.0 | 10.0 |
| Volume of solution A used (cm3) | 25.0 | 25.0 | 25.0 |

 Complete table (converted) √1

 Correct arithmetic √1

 Decimal place √1

 Accuracy √1

 4m

 (ii) Average volume of solution A used

 25.0 + 25.0 + 25.0 √ ½

 3

 = 25.0cm3 √ ½

(b) (i) Moles of HCl used = 0.1 x 25/1000

 = 0.0025 mol √ ½

 Moles ratio of acid : B2X.10H2O = 2 : 1 √ ½

 ∴ Moles of B2X.10H2O used = ½ x 0.0025 √ ½

 = 0.00125 mol √ ½

 (ii) 25cm3 of B2X.10H2O contains 0.00125 mol

 1000cm3 of B2X.10H2O contains 100/25 x 0.00125 √1

 = 0.05M √1

 Penalise ½ m for missing or wrong units

(iii) 0.05 mol of B2X.10H2O weighs 19.1g √ ½

 1 mol of B2X.10H2O weighs 1 x 19.1 √ ½

 0.05

 = 382g

 R.F.M of B2X.10H2O = 382 √1

 Penalise ½ m if units are used

 (iv) B2X.10H2O = 382 √ ½

 2B + 156 + 180 = 382 √ ½

 2B = 382 – 336

 2B = 46 √ ½

 B = 23 √ ½

3. a)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| - Colourless liquid ✓ / forms on cooler part of the test – tube-Red litmus paper change ✓ 1 of blue and blue litmus paper remain unchanged (1mk) | Hydrate salt ✓ 1NH4+ions (1mk) |

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| b)i)Solid dissolve in water to form a colourless solution ✓ 1mk (1mk) | A soluble salt ✓ 1mk (1mk) |
| **Observation** | **Inference** |
| ii) White precipitate ✓ 1mk does not dissolve (1mk) | SO42- , Cl-(aq) ions (1mk) |

|  |  |
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| **Observation** | **Inference** |
| iii) White precipitate ✓ ½ mk does not dissolve ✓ 1mk (1mk) | SO­42- ✓ ½ mk (1mk) |

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| iv) Green precipitate does not dissolve ✓ 1mk (1mk) | Fe2+(aq) ions ✓ 1mk (1mk) |

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| v)Yellow solution formed ✓ 1mk  | Fe3+(aq) ions 1mk  |

**3.** (i)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| Solution burns with a yellow flame✓ 1mk  |  Na+ ✓ 1mk  |

ii).

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| Permanganate id decolourised from purple✓ 1mk  |  SO32- present✓ 1m |

iii).

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| Dichromate changes from orange to green✓ 1mk | SO32- present✓ 1mk  |

iv)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| White precipitate which dissolves on addition of nitric acid✓ 1mk  |  SO32-✓ 1mk  |

4.a).

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| The solid melts and burns with a yellow sooty flame✓ 1mk  |  C = C , ⎯ C ≡ C ⎯ (1mk) |

b).i)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| It dissolves to form a colourless solution✓ 1mk  | Polar substance✓ 1mk  |

ii)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| Potasiummanganate(vii)is decolourised from purple✓ 1mk  | ✓ 1mk C = C , ⎯ C ≡ C ⎯  |

iii).

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| Effervescence occurs ✓ 1mk  | H+/H30+/R-COOH✓ 1mk  |