**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**021**

**Kenya Certificate of Secondary Education**

**CHEMISTRY**

**PAPER 3**

**OCT 2021**

**MARKING SCHEME**

1. **Procedure I**

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | **1** | **2** | **3** |
| Final burette reading  | 25.1 | 35.0 | 39.9 |
| Initial burette reading | 0.0 | 10.0 | 15.0 |
| Volume of solution **B** used | 25.1 | 25.0 | 24.9 |

 ( Compare / use the teacher’s value )

Award marks as follows:

A: Complete table ( 1 mark )

 Conditions

 Complete table with three titration 1 mark

 Incomplete table with two titrations ½ ark

 Incomplete table with one titration 0 mark

B: Decimal place ( 1 mark)

 Conditions :

 Accept only one or two decimal places used consistently.

 If two decimal place the 2nd decimal place MUST be either o or 0.5

C : Accuracy 1 mark

 Compare the student’s titre value with teachers titre values.

 Conditions

 At least within ± 0.1 1 mark

 At least within ± 0.2 ½ mark

 Above ± 0.2 0 mark

D: Principles of averaging 1 mark

 Values averaged must be shown and within ± 0.1 of each other

1. (a) 25.1 + 25.0 + 24.9 √ ½

 3

 = 25.0cm3 √ ½

 (b) Moles of acid that reacted

 If 1000cm3 0.2 moles

 Then 25cm3 25.0 x 0.2 √1

 1000

 = 0.005 moles √ ½

**Procedure II**

Table II

Award according to procedure I table I

|  |  |  |  |
| --- | --- | --- | --- |
|  | **1** | **2** | **3** |
| Final burette reading | 12.6 | 25.1 | 37.6 |
| Initial burette reading | 0.0 | 12.6 | 25.1 |
| Volume of solution **B** used | 12.6 | 12.5 | 12.5 |

 ( Compare / use the teacher’s value )

(c ) 12.6 + 12.5 + 12.5 √ ½

 3

 = 12.5333cm3 √ ½

(d) (i) Moles of the acid

 If 1000cm3 0.2 moles

 12.5333cm3 0.2 x 12.5333 √1

 1000

 = 0.002506 moles √ ½

 (ii) Moles of sodium hydroxide

 Mole ratio

 H+ : OH-

 1 : 1 √1

 ∴ 0.002506 : 0.002506

 Ie 0.002506 moles √ ½

(e) Moles of acid that reacted with sodium carbonate

 Ans (b) – ans (dii)

 0.005 moles – 0.002506 moles √1

 = 0.002494 moles √ ½

(f) Molarity of **A** in terms of NaOH

 If 25.0cm3 0.002506

 The 1000cm3 0.002506 x 1000 √1

 25cm3

 = 0.10024M √ ½

(g) CO32- (aq) + 2H+ (aq)  H2O (l) + CO2 (g)

 [Unbalanced 0 mark

 Missing state symbol ½ mark]

(h) (i) Moles of sodium carbonate

 ½ x 0.002494 √ ½

 = 0.001247 moles √ ½

 (ii) Molarity of **A** in terms of Na2CO3

 If 25cm3 0.001247

 Then 1000cm3 0.001247 x 1000 √1

 25

 = 0.04988M √ ½

2.

|  |  |  |
| --- | --- | --- |
|  | **Observations**  | **Inferences** |
| 2. (a)  | - Solid melts √ ½ - Burns in yellow√ ½ sooty flame √ ½ Max 1 ½ marks  | - Presence of either  C = C √ ½ or C C √Max 1 mark  |
| (b)  | - Dissolves √ ½ into a colourless √ ½ solution Max 1 mark  | * Solid is polar √ ½

Max ½ mark |
| (c ) | * Acidified KMnO4 changes from purple to colourless √ ½

Max ½ mark  | - Presence of either  C C √ ½ or C C √ ½ or  R – OH √ ½ Max 1 ½ marks |
| (d) | * Acidified K2Cr2O7 changes from orange to green √ ½

Max ½ mark | - Presence of either  C C √ ½ ; C C √ ½ or  R – OH √ ½ Max 1 ½ marks  |
| (e) | * Effervences √ ½ production of colourless gas √ ½

Max 1 mark  | H+ √ ½ / O  C OH presentMax ½ mark  |
| (f) | pH 4 √ ½ Max ½ mark  | Weakly acidic √ ½ Max ½ mark |
|  |  |  |
| 3 (a)  | - Colourless liquid on cooler parts of test tube √ ½ - Colourless gas with pungent smell √ ½ - Gas turns moist red litmus blue √ ½ / Blue litmus remains blue √ ½  | - Hydrated salt √ ½ - Presence of NH4+ √ ½ 1  |
| (b) | * Solid dissolves into pale green solution √ ½
* 1
 | * Polar solid √ ½
* Presence of Fe2+ √ ½

1 |
| (c ) | -Green √ ½ ppt insoluble √ ½ in excess- PPt turns brown on exposure to air √ ½ 1 ½  | - Presence of Fe2+ √ ½ - Fe2+ oxidized to Fe3+ by air √ 11 |

|  |  |  |
| --- | --- | --- |
| (d) | - Green ppt √ ½ insoluble in excess - Ppt turns brown on exposure to air √ ½ 1 ½  | - Presence of Fe2+ √ ½ - Fe2+ oxidized to Fe3+ by air √ ½ 1 |
| (e) | * Pale green solution turns yellow √ ½
* Brown √ ½ ppt insoluble √ ½ in excess

1 ½  | - Presence of Fe3+ √ ½ ½  |
| (f) | - Formation of white ppt √ ½ as residue and green solution as filtrate √ ½1 | * Presence of Fe2+ √ ½
* Presence of either Ce- √ ½ , SO42- √ ½ or SO32- √ ½ , CO32- √ ½

Max 2 marks  |
| (g) | * White ppt forms √ ½

½  | SO42- present √ ½ ½  |

***This is the last printed page***