**SET 1**

**CHEMISTRY 233/3**

# MARKING SCHEME

Q1. Table 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading cm3 | 15.6 | 31.2 | 15.6 |
| Initial burette reading cm3 | 0.0 | 15.6 | 0.0 |
| Volume of solution B used cm3 | 15.6 | 15.6 | 12.5 |

The marks are to be distributed as follows.

1. Complete table ………………………. 1 mk

(i) Complete table with 3 titration’s done award………………. 1 mk

(ii) Incomplete table with 2 titration’s done award……………... 1/2 mk

(iii) Incomplete table with 1 titration done award……………… 0 mk

Penalties

* Wrong arithmetic
* Inverted table
* Burette readings above 50 unless explained
* Unrealistic titre values i.e. values in hundreds or below 1.0cm3

 Penalise ½ mark for each to a maximum of ½ mark i.e penalise ½ mark once.

 b) Use of decimals …………………………………………………. (1 mk)

1. Accept only 1 or 2 decimal places used consistently otherwise penalise FULLY and award 0 mark .
2. If the two decimal places are used the 2nd decimal place must be either “0” or “5” otherwise penalise fully.

 c) Accuracy ……………………………………. (1 mk)

 Compare the candidates titre values with the teachers value.

 Conditions

1. If at least one of the titre values is within +0.1cm3 of the teachers value award………………………………….. (1 mk)
2. If no value is within +0.1 of teachers value but atleast one is within +0.2 of teachers value award………………………….. ½ mk

 d) Principle of averaging …………………………………… (1 mk)

 values to be averaged must be shown and must be within +0.2 of each other.

 Conditions

 (i) If 3 consistent titrations are done and averaged award………………….. (1 mk)

 (ii) If 3 titrations are done and ONLY two are consistent and averaged award (1 mk)

 (iii) If only two titration’s are done are consistent and averaged award (1 mk)

 (vi) If three titres are possible but only two are averaged award (0 mk)

 (v) If 3 inconsistent titres are averaged award (0 mk)

 (vi) If only 2 titration’s are done are inconsistent and averaged award (0 mk)

 (vii) If only 1 titration is done award ……………………………………… (0 mk)

 e\) Final answer………………………………………………………………. ( 1 mk)

 Compare the candidate’s correct average titre with the teacher’s value.

1. If within +0.1 of teachers value award ……………………………… (1 mk)
2. If not within +0.1 of teacher’s value but within +0.2 award (1/2 mk)
3. If beyond +0.2 f teacher’s value award ……………………………… (0 mk)

TABLE II.

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading cm3 | 17.9 | 35.8 | 17.9 |
| Initial burette reading cm3 | 0.0 | 17.9 | 0.0 |
| Volume of solution D used cm3 | 17.9 | 17.9 | 17.9 |

 **CALCULATIONS**

1. 15.6+15.6+15.6 √ ½ = 15.6cm3√ ½

 3

1. In 1000cm3 of B = 0.2 moles

 in 15.6cm3 of b ≡ 15.6 (ans (a) above) x 0.2 √ ½

 1000

 = ans √ ½

1. Mole ratio NaoH: H2SO4 √ 1

 2 : 1

 Concentration of solution C used = ans in (b) X 1000√ 1

 2

 25

 = ans. √ 1

d) i) 17.9+17.9+17.9 √ ½ = 17.9 cm3 √ ½

 3

 (ii) ans(c) x25 ÷ 2 √ 1

 1000

 = Answer √ 1

(iii) ans(d(ii))X 100 √ 1

 ans(d(i)

 = Answer √ 1

1. 100x0.2 √ ½ = ans√ ½

 1000

1. Ans (iv) ­­– ans (iii) √ ½ = ans√ ½
2. Mole ratio: CO32- : H+ √ 1
3. : 1

Ans(v)x 1÷1 = ans √ 1

e)i) 1 x ans d (vi) √ 1 = ans√ 1

 0.5

ii) (ans (e(i) – 60)÷ 2√ ½ = ans√ ½

# CONDITIONS

1. Penalise ½ mk in answer if wrong units are given otherwise ignore when units are omitted.
2. Penalise ½ mk for wrong transfer of average titre in (iv) above otherwise penalise FULLY for a strange figure.
3. Answer in (iii) above should be atleast to 4 decimal places unless it works out exactly to less than 4 decimal places, otherwise penalise ½ mk on the answer.

Table 2

Conditions to apply as in table 1.

# CALCULATIONS

(ii) No. of moles of NaoH used = 25 x 1

 1000

 = 0.025 moles √ ½

 Mole ration NaoH : H2SO4

 **2** :  1 √ ½

 .

 . .

 No of moles of solution K used = 0.025 √ ½

 2

= 0.0125 moles √ ½

 (iii) No of moles H2SO4 in 100 x 0.0125 √ ½

 100cm3 of the solution = average titre

 = Answer √ ½

 √ ½

 (iv) No. of moles of H2SO4 that = Answer a (iv) – Answer b(iii) of reacted Na2CO3 with 0.5g

 = Answer √ ½

 (v) Mole ratio X2CO3 : H2SO4

**1** : **1** √ ½

 √ ½

 No of moles of X2CO3 in 0.5g = Answer (iv) above.

 .

 . .

 0.5g of X2CO3 ≡ Answer (iv) above

 x

 .

 . . ≡ 1 mole

 Relative formular mass of x2co3 = 1 x 0.5 √ ½

 Answer (iv)

 = Answer √ ½

 (vi) 1 moles of x2co3 ≡ Answer (v) above

 .

 . . x = Answer (v) – 60 √ ½

 2

 = Answer √ ½

# CONDITIONS

1. The average titre in \(iii) should be transferred intact otherwise penalise fully.
2. Answer a (iv) and answer b(iii) in (iv) above should be transferred intact otherwise penalise FULLY.
3. Penalise fully for any working beyond the expected answer.

|  |  |
| --- | --- |
| 2(a) ObservationDroplets of colourless √1 liquid formed on cooler parts of the test tube (penalize fully if water mentioned)Blue litmus remains blue while red litmus turns to blue √1 (penalize fully if only one litmus paper mentioned ) | Inference Hydrated √ ½ saltWater of crystallization present.NH4+ present √ ½ (Reject NH3) |
| (b) ObservationDissolves √ ½ to form a colourless solution/green solution √ ½  | InferenceSoluble salt present Fe2+ present (answer attached to green solution) |
| (c) ObservationWhite precipitate insoluble on addition of dilute HNO3(aq) √1 | Inference Fe2+ present √1 |
| (d) ObservationWhite precipitate insoluble on addition of dilute HNO3(aq) √13. (a) Observation-melts√ ½ -burns with a yellow sooty √ ½ /smocky/luminous flame-leaving no residue √ ½  | Inference SO42- present √1Inference C=C, -C= C -(penalize fully if one is left out) |
| (b) (i) ObservationsPurple acidified KMnO4 is decolourised/purple solution changes to colourless. (penalize fully if initial colour of KMnO4 is not mentioned ) | Inference C=C, -C=C-√ ½  |
| (ii) ObservationOrange acidified K2Cr2O7 changes to green. | InferenceC=C, -C= C-√ ½  |