CHEMISTRY PAPER 3

Question 1

Notes to award marks on the table.

 TABLE 1

|  |  |  |  |
| --- | --- | --- | --- |
| Titre number  | I | II | IIICT = 1 DP = 1 Acc = 1Ap = 1FA = 15  |
| Final burette reading cm3 | 28.0 | 28.0 | 28.0 |
| Initial burette reading cm3 | 0.0 | 0.0 | 0.0 |
| Titre volume cm3 | 28.0 | 28.0 | 28.0 |

1. CT – complete table 1mk

The table should be filled completely

*Errors like*

* Values recorded beyond 50.0cm3
* wrong arithmetic between final and initial
* inversion of the table
* titre values less than 1

penalize ½ mk only for any point of the errors mentioned above.

1. **D.p. = Decimal point 1mk**

Either all values recorded to 1 d.p OR all recorded to 2 d.p, second figure of the d.p being 0 or 5 only e.g. 23.60 , 24.75 not 21.36 , 22.57

A student should not record same values to 1 d.p other to 2 d.p in the same table. If this happens award 0mk for d.p

1. **Acc. = Accuracy …………1mk**

Consider any one of the candidates’ titre if within 0.0 to 0.1cm3 of school value (s.v) award 1 mk

±0.11 to ± 0.20cm3 of school value (s.v) award ½ mk

If beyond ± 0.20cm3 award 0mk

1. **PA = Principles of Averaging ……1mk**

i) Candidates to average 3titres if they are within ± 0.1cm3 to one another i.e. maximum deviation between smallest and largest being 0.20cm3, if beyond this limit award 0mk

Or

1. Candidates to average 2 titres if only 2 titres are possible
2. If a candidate averages 2 titres when three are possible award 0mk for averaging.
3. Averaged titre to be recorded to 2d.p if it is recurring e.g. 26.333 to 26.33 not 26.3 or 26.35

Round off or truncate allowed e.g 24.6666 to 24.67 or 24.66

1. **F.A – Final Answer ………………1mk**

This is correctly averaged titre compared to school value.

Award marks as for accuracy.

0.0 to ± 0.10 ½ mk

0.11 to ± 0.20 ½ mk

Summary of award of marks to be written beside the table

N/B

School value is obtained by the teacher performing the experiment and calculating the average titre.

**CALCULATIONS PROCEDURE 1**

1. Molarity of solution A = 6.95 x 1000

 278 250

 = 0.1 molar ½ mk

 No. of moles = 0.1 x 25 = 0.0025moles ½ mk

 1000

1. Mole ration A:B is 5 : 1 ½ mk

So moles of B = 1/5moles of A

 = 1/5 x 0.0025 = 0.0005moles ½ mk

1. Av. Titre had 0.005mol.

Therefore 100cm3 of solution B has = 1000 x 0.005

 Average titre ½ mk

e.g. 1000 x 0.0005 = 0.0179

 28 NB: ***use candidate’s titre value in part (i) above***

**PROCEDURE II**

**TABLE II 5mks**

**Award marks as shown in table I**

**Calculations Procedure II**

* + 1. 1000cm3 of solution B has

Therefore Average titre has

 = Av, Titre table II x (ans. in c above) ½ mk

 1000

= ans ½ mk

* + 1. Mole ration B: C is 2:5

No. of mole of C = 5/2 moles of B ……………… ½ mk

 = 5/2 x ans. in (a) above.

e.g. 5/2 x 0.00429 = 0.001073 ½ mk

* + 1. 25cm3 of solution. C has (ans in (b) above)

1000cm3 of solution C. has 1000 x ans. (b) above ½ mk

 25

 = ans.

e.g. 24 x 0.0179 = 0.000429

 1000 ½ mk

***Grand total marks for Q1 = 17mks***

**Question 2**

**Table III**

|  |  |  |
| --- | --- | --- |
| Volume of water in boiling tube cm3 | Temp. at which crystals of F first appear 0C | Solubility of solid F CT2D1AC ½ Td ½ Sol 2 6(g/100g of water) |
| 15 | 80 | 26.5 |
| 20 | 71 | 20 |
| 25 | 65 | 16 |
| 30 | 52 | 13.3 |
| 35 | 48 | 11.4 |
| 40 | 45 | 10 |

**Notes on marking table**

**CT =Complete table …………….2mk (temp. column only)**

 2mks for all temp. values filled, 1 ½ mkfor only 4 or 5 entries made, 1mk for 3 entries and 0mk for only 2 or 1 values entered

Penalize ½ mk for all temp. readings above 84.50 and below 100C to a maximum of 1mk

**D.P = Decimal point ………1mk**

 All temp. values to be recorded as whole numbers *OR* with a decimal as 0 or 0.5 only if any other figure is used award 0 mk for d.p

**Accuracy ……… ½ mk**

Compare the candidates temp. reading at volume 15cm3 with that of the teacher.

If ±20C from the school value award ½ mk

**Trend ………………. ½ mk**

 Award ½ mk for continuous temp. drop, otherwise penalize fully.

 **Solubility column …………….. 2mks**

 For 6 correct entries ……………………2mks

For 4 or 5 correct entries …………….. 1 ½ mks

For 3 correct entries …………………. 1mk

Below 3 entries ………………………0mk

1. **Graph …………………3mks**

**Labelled axis ……………… ½ mk**

Axis to be labeled with quantities and unit i.e. Temp in 0C and solubility ( g / 100g of water).

**Scale ………………. ½ mk**

Plot to cover 2/3 of the given grid.

**Plots …………..1mk**

 To be plotted accurately

**Curve ……………….1mk**

 Plots to be joined to give a smooth curve increasing with increase in temp. award 1mk smooth curve passing through any experimental values one MUST be through 26.5g/100g of water.

1. Showing on graph at solubility 15g/100g of water (only from a correct curve) …….½ mk correct reading…….1/2mark

**Total marks for Question 2 = 10mks**

**Question 3. (13mks)**

1.

|  |  |
| --- | --- |
| ***Observation*** | ***Inference*** |
| * Colourless liquid forms on cooler sides of tests tube
* Colourless gas produced which relights a glowing splint
* Brown gas with a pungent smell produced

***Each ½ mk to a max. of 1mk*** | * Solid D is hydrated ½ mk
* NO3- ions present ½ mk
 |

|  |  |
| --- | --- |
| ***Observation*** | ***Inference*** |
| * + - 1. White ppt ½ mk

Soluble in excess ½ mk | AL3+, Zn2+, or Pb2+ present * 1mk for 3 cations
* ½ mk for 2 cations
* 0mk for 1 cation
 |
| * + - 1. White ppt ½ mk

Insoluble in excess ½ mk |  Al3+ ½ mk or Pb2+ ½ mk present  |
| * + - 1. No white ppt formed 1mk`
 |  Al3+, present 1mkOrPb2+ absent ½ mk |
| * + - 1. Burns with a blue smokeless flame ½ mk
 | Saturated organic compound OrHydrocarbon with low C:H ratio {any point ½ mk} or C C |
| * + - 1. Purple KMnO4 turns colourless 1mk
 |  R OH or ½ mk C = C C C ½ mk |
|  * + - 1. Orange K2Cr2O7 turns green 1mk
 |  R – OH present 1mk |