**233/3**

**CHEMISTRY**

**PAPER 3**

**MARKING SCHEME.**

**Table 1**

1. Complete table ……………… 4mks

Penalties / conditions

* + Penalise ½ mk for each space not filled in the time taken row.
  + Reject fractions for 1 and award a maximum of 2 ½ marks on the table

t

* + Penalise ½ mark for wrong arithmetic in the reciprocals not within an error of  2 units in the 3rd dec places, unless it divides exactly.
  + Accept reciprocals expressed in standard form / powers of ten.
  + Accept reciprocals given to at least 3 dec. places otherwise penalise ½ mk each for rounding off to 2nd dec. place to a maximum of 1mk unless it divides exactly.
  + Penalise ½ mk for each entry not is seconds e.g. given in minutes.
  + Penalise ½ mk for every time reading  15 and  180 seconds in time column.
  + Penalise ½ mk for each entry in fraction in the reciprocal column.

1. **Use of decimals – ½ mk**

(Tied to time row only)

Accept whole numbers or decimals upto 2nd dec. place is only used consistently, otherwise penalise fully.

1. Accuracy ----------- ½ mk

Compare the candidates first reading to the school value(SV ) and if within  2.0 seconds, award 1mk, otherwise penalise fully.

1. **Trend ----------1mk**

Award 1mk if time is increasing otherwise penalise fully

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Length of solid R added cm  (Magnesium ribbon | 1 | 2 | 3 | 4 | 5 |
| Time taken in seconds | 70.42 | 80.65 | 92.60 | 108.70 | 135.00 |
| Rate of reaction = 1/time | 0.0142 | 0.0124 | 0.0108 | 0.0092 | 0.0074 |

***Complete table- 4marks***

***Decimals – ½ mark***

***Accuracy – ½ mark***

***Trend – 1 mark***

1. i) **Scale --------------------1mk**
   * Area covered by actual plots must be at least half of the big squares ( y – axis) and half of the big squares ( x – axis)otherwise give zero.
   * Scale used must be consistent on both axes, otherwise penalise fully.

**Labelling of axes (both) ------------- ½ mk)**

* + Penalise ½ mk for wrong units used in any of the axis
  + Penalise ½ mk for inverted axis
  + Accept if no units shown on labeling.

**Plotting -------------1mk**

* + Accept 4 or 5 points correctly plotted for 1mk
  + If 3 or 4 points are correctly plotted award ½ mk
  + If 2 or less points are correctly plotted gives Zero
  + Accept correct plots even if the axes interchanged.
  + If points in the table are 3 or more decimals penalise ½ mk ONCE otherwise accept rounding of to 3rd dec. place

**The line------------1mk**

Accept a straight line passing at least 2 points correctly plotted and if extended can go through both x and y axis otherwise penalise fully.

ii) - Showing 1 on the graph  ½ mk

- Stating the correct reading  ½ mk

- Applying the expression t = 1  ½ mk

Correct reading

* Correct answer  ½ mk

**Conditions**

* penalise  ½ mk if not shown on the graph to obtain the value.
* Award 1mk if not shown on graph and not recorded but used correctly in the expression.
* Award 0 mk if not on the graph and value stated is wrong.

1. rate decreases with decrease in concentration of solution Q (sulphuric acid) 1 mk or vices versa(Rate and concentration are directly proportional)

1. Equation Mg(s) + H2SO4(aq) MgSO4 + H2(g) 

Mole ratio 1:1

Moles of Mg = 0.13 \_ = 0.0542

24  ½ mk

Hence moles of H2SO4 used = 0.0542  ½ mk

Penalities / conditions

1. 0.13g of solid R and RAM of solid R should be intact otherwise penalise fully
2. Accept answer given to at least 4 dec. places
3. Otherwise penalize ½ mk
4. Penalise ½ mk for wrong answer if error is outside  2 units in the 4th dec. place.
5. Units may not be shown, but if shown **MUST** be correct, otherwise penalise ½ mk for wrong units.
6. J

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Final reading (cm3) | 14.60 | 29.20 | 43.80 |
| Initial reading ( cm3) | 0.00 | 14.60 | 29.20 |
| Volume of s used in ( cm3) | 14.60 | 14.60 | 14.60 |

Complete table ( 1mk)

Decimals ( 1mk)

Accuracy ( 1mk)

Principal ( 1mk)

***Final answer ( 1mk) Total 5 mks***

a) Complete table ---------------------1mk

Complete table with 3 titrations ------1mk

**Penalies**

1. Unrealistic values i.e values below 1cm3 or hundreds
2. Burette readings beyond 50cm3 unless explained
3. Inverted table
4. Wrong arithmetic

Penalise ½ mk each for a maximum of ½ mk

1. **Decimals ----------1mk**

(Tied to the 1st and 2nd rows only)

Should be 1 decimal place or 2 decimal place used consistently otherwise penalise fully.

The 2nd decimal place should either be a 0 or 5

1. **Accuracy ------------1mk**
   1. If any titre value within  0.1 of the school value ---------------------------------award 1mk
   2. If any titre within  0.2 of the school value ½ mk
   3. If non-of the titre value is within  0.2 of school value (s.v)-----------0mk
2. **Principal of Averaging -------------1mk**

Value averaged **MUST** be shown and **MUST** be within  0.2 of each other

**Conditions**

* 1. If 3 consistent values are averaged -----------1mk
  2. 3 titrations done only 2 are possible and averaged ---1mk
  3. 3 consistent values but only 2 are averaged award 0mk
  4. 3 consistent values are average award 0mk

**Penalises**

1. Penalise ½ mk for arithmetic error in answer outside  2 units in the 2nd dec. place.
2. Penalise ½ mk for **NOWORKING** is shown but the answer is correct.
3. Accept rounding off to the 2nd dec.place otherwise penalise ½ mk if answer is rounded off the 1st dec. place unless value divide exactly to 1 dec. place
4. **Final answer --------------------1mk**

(Compare to school value (S.V) Tied to correct average titre)

* 1. If within  0.1 of S.V ---------1mk
  2. If within  0.2 of S>V --------1mk
  3. If beyond  0.2 of S.V---------0mk

e)iii) **II**

Average titre x 1.5 =Correct answer

1000 ½ mk ½ mk

**Condition /penalties**

1. Penalise ½ mk for wrong Transfer (WT) of titre otherwise Penalise fully for strange value
2. 1.5 Must be transferred INTACT otherwise penalise fully
3. Penalises ½ mk for arithmetic error outside  2 units in the 4th dec. place
4. Accept rounding off of the answer to the 4th dec.place
5. Units may not be shown but it shown must be correct, otherwise penalise ½ mk for wrong units.

**III** Acid : Base Ratio

Mole ratio 1:2 ½ mk

Answer 11 = Correct Answer

2  ½ mk  ½ mk

**Conditions /penalties**

1. Penalise ½ mk for wrong Transfer (WT) of Answer II, otherswise penalise fully for strange value
2. Penalise ½ mk for an arithmetic error outside  2 units in the 4th dec. place
3. Same as (iv) in II above
4. Same as (v) in II above

**IV** Moles in 100cm3 of solution T

Answer 111 x 100 = Correct Answer

25 ½ mk  ½ mk

**Conditions/ penalties**

1. penalise ½ mk for arithmetic error outside  2 units in the 4th dec. place
2. Penalise ½ mk for wrong transfer / rounding off of answer 111
3. Same as (IV) in 11 above
4. Same as (V) in 11 above
5. Moles ratio for reaching of Mg to H2SO4 is 1:1

Moles of H2SO4 used in procedure 1

Answer 1 (d)

Answer 1 (d) + Answer iv = Correct Answer

 ½ mk  ½ mk

**Conditions / penalties**

1. Penalise ½ mk for WT of Answer 1 (d) or answer iv or for both otherwise penalise fully for strange value.
2. Penalise ½ mark for arithmetic error outside  2 units in the 4th dec. place.
3. Same as (IV) in 11 above
4. Same as (V) in 11 above
5. Molarity of solution Q - H2SO4

1000 x answer (iv)  ½ mk

50

Correct answer  ½ mk

**Conditions /penalties**

1. Penalise ½ mk for wrong Transfer WT answer (IV) otherswise penalise fully for strange value.
2. Same as (ii) in (iv) above
3. Same as (iv) in 11 above
4. Same as (V) in 11 above

**Total marks**

**2. Observations Inferences**

|  |  |
| --- | --- |
| 1. Solid dissolves ½ to colourless solution ½ | Polar / soluble solid ½  Absence of coloured ions i.e.  ½ Cu2+, Fe2+, Fe3+ |
| 1. i) White  ½ppt insoluble  ½ in excess | Pb2+ or Al3+ present |
| ii) No white ppt  1 | Al 3+ 1 |
| iii) White ppt  1 | Cl-, SO32- , SO42- or CO32-  Present  ***Any 4 ions – 2mks***  ***2 – 3 ions – 1mk***  ***1 ion – ½ mk*** |
| iv) No white ppt 1 | Absence of SO32-, CO32- or SO42-  ***3 ions – 2mks***  ***2 ions – 1mk***  ***1 ions – 1mk*** |
| v) Red litmus  ½ remain red while Blue litmus turns red ½ | Acidic salt 1  possibly Al Cl3 |