**233/3**

**CHEMISTRY**

**PAPER 3**

**MARKING SCHEME**

1. a) **Complete table ---------** 1mk

Must have 3 titrations done for 1mk

Penalise ½ mk once for any of the following

* Wrong arithmetic
* Inverted table
* Readings beyond 50cm3 unless explained
* Unrealistic titre value on the burette values below 1.0cm3 or above 100cm3

1. **Use of decimals – 1mk**

Tied to 1st and 2nd rows only

* 1. Accept 1 or 2 dec. places used consistently
  2. If 2nd dec. place is used must be ‘O’ or ‘5’

(Penalise fully if any of the conditions is not met) Bdd

1. **Accuracy ----** 1mk

Compare the candidate reading to the school value

Conditions : (i) If any titre is within ± 0.1 of s.v 1mk

1. If none is within ± 0.1 of s.v but least within ± 0.2 s.v award 1mk
2. If none is within ± 0.2 of s.v 0 mk
3. **Principle of Averaging** 1mk

Conditions

i) If 3 consistent values are averaged 1mk

ii) If 3 titrations done and only 2 are possible and averaged 1mk

iii) If any 2 titrations are done inconsistent and averaged 0mk

iv) If 3 titrations are done, all are possible and only 2 averaged 0mk

v) If 3 titrations are done are inconsistent and averaged 0mk

**Penalties**

1. Wrong Arithmetic i.e error outside ± 2 units in the 2nd dec. place penalise ½ mk
2. If no work is shown but answer given is correct penalise ½ mk
3. If the answer is rounded off to the 1st dec. place penalise ½ mk
4. If no working is shown and answer given is wrong penalise fully - 0mk
5. **Final answer**- 1mk

Compare to the s.v and tied to the correct average titre

Compare the candidates correct average titre with the s.v and

i) If within ± 0.1 of s.v ………………………….. 1mk

ii) If within ± 0.2 of s.v ………………………….. ½ mk

iii) If beyond ± 0.2 of s.v ………………………….. 0mk

Summary

CT - 1mk

Dec –1mk

AC- 1mk

PA- 1mk

FA- 1mk

**05**

**CALCULATIONS**

c) I 25 x 0.1 = correct Ans

1000

**Penalties**

1. Penalise fully for strange figure
2. Penalise ½ mk for wrong answer if error is outside ± 2 units in the 4th dec. place
3. Accept answer given to at least 4 dec. places otherwise penalise ½ mk
4. Units may not be shown, but if shown MUST be correct otherwise penalise ½ mk for wrong units

II mole ratio

NaOH : Acid (dibasic)

2 : 1 ½ 🗸

∴ Answer I = corr. Ans

2 🗸 1mk 🗸 ½ mk

**Penalties**

Treat as in (i) - (iv) in CI above

III 100 x Answer C(II) = correct answer

Titre volume 🗸 ½ mk 🗸½ mk

**Penalties**

(i) Penalise ½ mk for WT (wrong transfer) of titre, otherwise penalise fully for strange figure

(ii) Penalise ½ mk for wrong answer if the error is outside ± 2 units in the 4th dec place

iii) Treat as in (iii) – (iv) in C(i) above

iv) 20cm3 diluted to 100cm3 therefore number of moles in 20cm3 is equal to moles

in 100cm3  = correct answer 🗸 ½

***Answer III same as IV***

**Penalties**

1. penalise ½ mk for wrong Transfer (WT) otherwise fully for strange value
2. Penalise ½ mk for rounding off answer to atleast 3 dec places

v) Answer IV x 250 = correct answer

20 🗸½ mk 1mk

**Penalties**

Treat as in (i) – (iv) in C I above

d) Molar mass = 9.0 🗸 1mk

Answer V

= correct Answer 🗸1mk

d **I Penalties**

i) penalise ½ mk for WT of answers in V, otherwise penalise fully for any strange figure used in the calculation

ii) Same conditions for units

iii) penalise ½ mk for not rounding off answer to a whole number

II

H2MO4 = (2x1) + M+ ( 4 x 16) = Answer dI

🗸 ½

= M + 66 = Answer d I **2**

🗸 ½

M = Answer d I – 66

M = Correct answer🗸 1

**Penalties**

1. Penalise ½ mk for WT of answer in d II, otherwise penalise fully for any strange figure used in the calculation.
2. Penalise ½ mk for no units given
3. Penalise fully for answer if value of M is given as 38 or less
4. Penalise fully for answer if value of M is as 60 or more.

**Total 16 mks**

**Table marks 3mks distributed as**

2. i) complete table with 12 correct readings 3mks

Incomplete table with 10 “ “ 2mks

“ “ 8 “ “ 1 mk

“ “ 6-7 “ “ ½ mk

“ “ Less than 6 0mk

**Conditions and penalties**

* Accept 1/t values to at least 3 d.p otherwise penalise ½ mk each to maximum of 1mk unless they work out exactly.
* Treat temp. reading ∠ 50° C in column II expt1 as unrealistic and penalise ½ mk once
* Penalise ½ mk for wrong units attached otherwise ignore if not stated.

ii) Use of decimals 1 mk

(Tied to temp. at which purple colour disappear and time taken only)

* All readings of temp column II should either be whole nos or to 1 d.p.

consistently for ½ mk otherwise penalise fully.

* All readings in column III for time should be either whole nos or to 2 d.p used consistently for ½ mk otherwise penalize fully.

iii) Accuracy 1mk

(Tied to 1st readings in column II and III only)

* Temp. reading within ± 2°C of S.V should be credited ½ mk otherwise penalize fully
* Time reading within ± 5 seconds of school value should be credited ½ mk otherwise penalize fully.

iv) Trend 1mk

Temp reading in column II should decrease across ½ mk

Time reading in column III should increase across column ½ mk

Penalise fully for any discrepancies in trends

b) Graph 3mk distributed as

i) Scale 1mk

- graph should cover atleast ½ of graph paper otherwise penalise fully

- Intervals should be uniform otherwise penalise fully

ii) Labelling – ½ mk

* + Both axes should be labelled correctly
  + Penalise fully for wrong units attached to axes otherwise ignore

iii) Plotting (1mk)

* Accept atleast 3-4 correct readings – 1mk
* 2 correct readings – ½ mk
* Less than 2 - 0mk

iv) Shape of curve ½ mk

- Accept shade if it is a line otherwise penalise fully

1. 1/t = correct reading at 47.5° C – ½ mk

Time = 1 🗸½=🗸 ans🗸 1mk

√ 1

t

e) Rate of reaction is directly proportion to temp. of reactants 🗸1mk

**½ mk** **½ mk**

|  |  |
| --- | --- |
| Observations | Inferences |
| - Dissolve to form colourless solution | - Soluble salt- Absence of Fe2+, Fe3+, Cu2+ |
| No white precipitate | Na+, K+, NH4+ presentPb2+, Al3+, Zn2+, Mg2+ absent |
| b) Yellow flame | Na+ present |
| c) White ppt that dissolve on adding HCl | - CO2-3, SO2-3 present |
| Decolourises KMnO4 / turns acidified purple KMnO4 colourless | SO2-3 present |

b) K melts into a colourless **Accepts for 1mk**

liquid and Burns **½ mk** with A long chain hydrocarbon

Smoky yellow flame ½ mk High carbon – hydrogen ration

C = C or – C ≡ C-

unsaturated organic cpd

**Organic cpd tied to melting and burning**

**🗸 ½ mk** **🗸½ mk**

b) i) Acidified KMnO4 is decolourised**🗸 1mk** R – OH and C = C or – C ≡ C-

OR it is a reducing agent ½ mk

**Rej. Unsaturated hydro carbon**

ii) Bromine water is decolourised **🗸 1mk**  **🗸 1mk**

C = C or – C ≡ C-

**(1) penalise fully for any contradictory e.g. R-OH or RCOOH**

**(2.) Accept unsaturated cpd for ½ mk**

iii) pH 4 - 6 **🗸 1mk** Weak acid **🗸 1mk**

**Rej pH 76** **Accept for ½ mk, it is acidic / H+**

iv) Effervescence / bubbles of gas**🗸1mk** / hissing H+ or🗸1mk - COOH

sound Acidic solution formed / carboxylic

acid / organic acid**🗸 ½ mk**