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 $50cm^3$ unless explained
- Unrealistic titre value on the burette values below $1.0cm^3$ or above $100cm^3$

b) Use of decimals – 1mk

Tied to 1st and 2nd rows only

i) Accept 1 or 2 dec. places used consistently

ii) If 2nd dec. place is used must be 'O' or '5'

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

c) **Accuracy ----** 1mk

Compare the candidate reading to the school value

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

ii) If none is within ± 0.1 of s.v but least within ± 0.2 s.v award 1mk

iii) If none is within ± 0.2 of s.v 0 mk

d) **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

i) Wrong Arithmetic i.e error outside ± 2 units in the 2nd dec. place penalise ½ mk

ii) If no work is shown but answer given is correct penalise ½ mk

iii) If the answer is rounded off to the 1st dec. place penalise ½ mk

iv) If no working is shown and answer given is wrong penalise fully - 0mk

e) **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 $\frac{25 \times 0.1}{1000}$ = correct Ans

Penalties

i) Penalise fully for strange figure

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

iii) Accept answer given to at least 4 dec. places otherwise penalise ½ mk

iv) 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 $\frac{100 \times \text{Answer C(II)}}{\text{Titre volume}}$ = correct answer

✓ 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) $20cm^3$ diluted to $100cm^3$ therefore number of moles in $20cm^3$ is equal to moles in $100cm^3$ = correct answer ✓ ½

Answer III same as IV

Penalties

i) penalise ½ mk for wrong Transfer (WT) otherwise fully for strange value

ii) Penalise ½ mk for rounding off answer to atleast 3 dec places

v) $\frac{\text{Answer IV} \times 250}{20}$ = correct answer

✓½ mk 1mk

Penalties

Treat as in (i) – (iv) in C I above

d) Molar mass = $\frac{9.0}{\text{Answer V}}$ ✓ 1mk

= 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

$H_2MO_4 = (2x1) + M + (4 \times 16)$ = Answer dI

✓ ½

= M + 66 = Answer d I

✓ ½

M = Answer d I – 66

M = Correct answer✓ 1

Penalties

i) Penalise ½ mk for WT of answer in d II, otherwise penalise fully for any strange figure used in the calculation.

ii) Penalise ½ mk for no units given

iii) Penalise fully for answer if value of M is given as 38 or less

iv) 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

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

Time = 1 ✓½=✓ ans✓ 1mk

$\sqrt{\frac{1}{t}}$

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 Fe^{2+}, Fe^{3+}, Cu^{2+}
a) No white precipitate	Na^+, K^+, NH_4^+ present Pb^{2+}, Al^{3+}, Zn^{2+}, Mg^{2+} absent
b) Yellow flame	Na^+ present
c) White ppt that dissolve on adding HCl	- CO^{2-}_3, SO^{2-}_3 present
Decolourises $KMnO_4$ / turns acidified purple $KMnO_4$ colourless	SO^{2-}_3 present

b) K melts into a colourless liquid and Burns **½ mk** with Smoky yellow flame ½ mk

Organic cpd tied to melting and burning

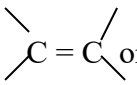
b) i) Acidified $KMnO_4$ is decolourised✓ **1mk**

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

Accepts for 1mk

A long chain hydrocarbon

High carbon – hydrogen ration



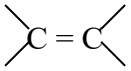
unsaturated organic cpd

✓ **½ mk** ✓**½ mk**

R – OH and  or – C ≡ C-

OR it is a reducing agent ½ mk

Rej. Unsaturated hydro carbon



✓ **1mk**

or – C ≡ C-

(1) pen any contradictory e.g. R-OH or RCOOH
(2.) Accept unsaturated cpd for ½ mk

iii) pH 4 - 6 ✓ **1mk**
Rej pH 76

Weak acid ✓ **1mk**
Accept for ½ mk, it is acidic / H^+

iv) Effervescence / bubbles of gas✓**1mk** / hissing sound

H^+ or✓1mk - COOH
Acidic solution formed / carboxylic acid / organic acid✓ **½ mk**