

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
- 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



c) I $\frac{25 \times 0.1}{1000} = \text{correct Ans}$

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

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

$\text{H}_2\text{MO}_4 = (2 \times 1) + M + (4 \times 16) = \text{Answer dI}$

$$= M + 66 = \text{Answer d I} \quad \checkmark \frac{1}{2}$$

$$M = \text{Answer d I} - 66 \quad \checkmark \frac{1}{2}$$

2



$$M = \text{Correct answer} \checkmark 1$$

Penalties

- i) Penalise $\frac{1}{2}$ mk for WT of answer in d II, otherwise penalise fully for any strange figure used in the calculation.
- ii) Penalise $\frac{1}{2}$ 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	“ “	$\frac{1}{2}$ mk
		“ “ Less than 6		0mk

Conditions and penalties

- Accept 1/t values to at least 3 d.p otherwise penalise $\frac{1}{2}$ mk each to maximum of 1mk unless they work out exactly.
- Treat temp. reading $< 50^\circ \text{C}$ in column II expt1 as unrealistic and penalise $\frac{1}{2}$ mk once
- Penalise $\frac{1}{2}$ 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 $\frac{1}{2}$ mk otherwise penalise fully.
 - All readings in column III for time should be either whole nos or to 2 d.p used consistently for $\frac{1}{2}$ mk otherwise penalize fully.
- iii) Accuracy 1mk
(Tied to 1st readings in column II and III only)
 - Temp. reading within $\pm 2^\circ \text{C}$ of S.V should be credited $\frac{1}{2}$ mk otherwise penalize fully
 - Time reading within ± 5 seconds of school value should be credited $\frac{1}{2}$ mk otherwise penalize fully.
- iv) Trend 1mk
Temp reading in column II should decrease across $\frac{1}{2}$ mk
Time reading in column III should increase across column $\frac{1}{2}$ mk
Penalise fully for any discrepancies in trends

b) Graph 3mk distributed as

- i) Scale 1mk
 - graph should cover atleast $\frac{1}{2}$ of graph paper otherwise penalise fully
 - Intervals should be uniform otherwise penalise fully
- ii) Labelling – $\frac{1}{2}$ mk
 - o Both axes should be labelled correctly
 - o 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) $1/t = \text{correct reading at } 47.5^\circ \text{ C} - \frac{1}{2} \text{ mk}$
 $\text{Time} = 1 \sqrt{\frac{1}{2}} = \checkmark \text{ ans } \checkmark \text{ 1mk}$
 $\frac{\sqrt{1}}{t}$
 - e) Rate of reaction is directly proportion to temp. of reactants \checkmark 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_3^{2-} , SO_3^{2-} present
Decolourises KMnO_4 / turns acidified purple KMnO_4 colourless	SO_3^{2-} present

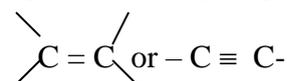
- b) K melts into a colourless liquid and Burns ½ mk with Smoky yellow flame ½ mk

Organic cpd tied to melting and burning

- b) i) Acidified KMnO_4 is decolourised \checkmark 1mk
- ii) Bromine water is decolourised \checkmark 1mk

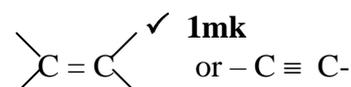
Accepts for 1mk

A long chain hydrocarbon
High carbon – hydrogen ration



unsaturated organic cpd

\checkmark ½ mk $\begin{array}{c} \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \end{array}$ \checkmark ½ mk
 $\text{R} - \text{OH}$ and OR it is a reducing agent ½ mk
Rej. Unsaturated hydro carbon



(1) penalise fully for 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**

