

SERIES 44 EXAMS

CHEMISTRY

PAPER 3

233/3

MARKING SCHEME

1. **Table 1...** marked out of 5mks
 a) Complete table with 3 titration alone .. 1mk

NOTE

- i) If only 2 titration are done are constant (1mk)
 ii) If only 2 titration and are inconsistent ... (½ mk)
 iii) If only 1 titration is done (0 mk)

Penalties

- i) Wrong arithmetic
 ii) Inverted table penalize ½ mk to maximum 1
 iii) Unexplained readings beyond 50.0cm³
 iv) Un realistic titre readings

- b) Use of the decimal (1mk)
 Check this in 1st and 2nd row only
 i) Only accept 1 or 2 decimals only used consistently.
 ii) If the 2nd decimal is used then the 2nd place is O or 5. Otherwise penalize fully.

- c) Accuracy (1mk)
 Compare any of the students values with the school value (s.v)

NOTE:

- i) At least one value is within ± 0.1 of the school value (1mk)
 ii) At least one value is within ± 0.2 of the school value (½ mk)
 iii) All values beyond ± 0.2 (0mk)
 d) Principal of averaging..... (1mk)

Note

- i) If 3 consistent titres are averaged. (1mk)

 ii) If 3 titrations are done ; only 2 are consistent and averaged .. award ... (1mk)
 iii) If non consistent values are averaged the award..... (0mk)

- e) Final answer
 Compare the school value with the average titre

NOTE

- i) Average within ± 0.1 of S.V... (1mk)
 ii) Average within ± 0.2 of s.v (½ mk)
 iii) Average beyond ± 0.2 of s.v (0mk)

Calculations

- i) Moles of MnO₄⁻ = 0.02 x Average titre ✓ ½

1000

Moles of $C_2O_4^{2-}$ = Answer I $\times \frac{5}{2}$ ✓ ½

Correct Answer II ✓ ½

ii) Moles of $C_2O_4^{2-}$ = $\frac{\text{Correct answer II} \times 250}{25}$

✓ ½

= Correct answer III ✓ ½

ii) Moles of $Na_2C_2O_4$ in $50cm^3$ of solution

= $\frac{\text{Answer III} \times 50}{25}$ ✓ ½

25 ✓ ½

= Correct Answer IV(iii) ✓ ½

iii) Moles of NaC_2O_4 in $50cm^3$ of water

= Correct Answer IV \times RFM(122) ✓ ½

= Answer V

Solubility of Na_2CO_4 = $\frac{\text{Answer V} \times 100}{50}$ ✓ ½

= Correct Answer VIg / 100g water at steady temp of candidate

CONDITIONS FOR CALCULATIONS

i) Average titre in (a) (i) must be transferred intact otherwise penalize fully for strange figures.

ii) Penalise ½ mk for surrounding off unless the values works out exctaly to less than 3 decimals in (a) i) and a(ii)

iii) When one answer is required in the subsequent steps; if should be transferred without alteration. Otherwise penalize fully for strange figures.

iv) if a wrong Answer is used correctly is subsequent steps; Awards accordingly

v) In a (iii) the correct units must be stated at the steady temperature for the candidate to earn full credit ; otherwise penalize ½ mk in the answer.

2. a) Table III ----- (4mks)

a) Complete table ... (1mk)

Penalties

1/t values less 3 d.pl

Unless of it works out exactly

- Any space not filled

- Any wrong values for 1/t with error greater than 2 units in the third decimal place

Penalise ½ mk for each to a maximum of 1mk

b) **Decimal** (1mk)

- Tied to the time column)

- Accept whole numbers in seconds for time recordings

- Reject mixed units for time recording and award zero

c) **Accuracy** (1mk)

- Compare the candidates first time recording to the teachers' value ;

- If ± 5 seconds - 1mk otherwise penalize fully

d) **Trend** (1mk)

- Accept a continuous increase in time recordings for fully credit – otherwise penalize fully.

- b) Graph (3mks)
- i) Axes.... (½ mk)
- Well labelled axes
 - Units if shown must be correct
 - Inverted axes should be awarded
- N/B
Penalize if any of the above is not fulfilled
- ii) Scale (1mk)
- The plots must be covering more than ½ of the grid provided
 - Scale internal must be uniform
- Otherwise penalize fully
- iii) Plots..... (1mk)
- 4 -5 plots correctly shown award (1mk)
 - 2 – 3 plots correctly shown award (½ mk)
- iv) Curve (½ mk)
- Accept a strength time going through the origin otherwise penalize fully
- ii) - Showing on the graph (1mk)
- Correct value (1mk) (2mks)
- iii) The concentration of thiosulphate ions is directly proportional to the rate of reaction. (2mks)

3. **PART I**

a)

Observation	Inferences
-Colourless liquid ✓ ½ formed on cooler part of the test tube - White residue ✓ ½ or solid is left (1mk)	- Hydrated salt - Present (1mk)

Conditions

- Reject observations if the following has been used
- Droplets
- Moisture
- Vapour
- Water condensed
- Colourless liquid condensed
- influence is tied to correct observation i.e colourless liquid formed

b)

Observation	Inferences
-Colourless ✓ ½ filtrate -White ✓ ½ residue (1mk)	-Compound ✓ ½ is sparingly soluble N/B - Accept the following tied to colourless filtrate for ½ mk i) Absence of coloured ions ii) Presence of (1mk)

i)

Observation	Inferences
Solution turns pink from ✓ 1 Colourless ✓ 1 (1mk)	OH- ✓ 1 HCO ₃ ⁻ = 3, CO ₃ ²⁻ ✓ 1 All 3 – 1mk 2 – ½ mk 1 – omk Accept basic for ½ mk

ii)

Observation	Inferences
No effervescence ✓ 1 (1mk)	OH ⁻ present OR CO ₃ ²⁻ , HCO ₃ ⁻ (1mk)

iii)

- Reject
- Wrong symbol check the 'O's 'C'
 - Joining of symbols
 - OH- if not mentioned in the b(i)
- White ✓ 1 ppt Ca²⁺ ✓ 1 Ba²⁺
- Joining of symbols
 - Wrong symbols
 - mark out out 1mk if there;s a contradiction
Pb²⁺ or Al³⁺ e.t.c

iv)

Observation	Inferences
No white ✓ 1 ppt (1mk)	Ba ²⁺ ✓ 1 or Ca ²⁺ (1mk)

PART II

a) i)

Observation	Inferences
Burns with a sooty flame ✓ ½ (1mk)	$C = C -$ or $-C \equiv C -$ (1mk)
	Reject - Wrong symbols - Alkenes, alkynes in words

ii)

Observation	Inferences
Dissolves ✓ ½ (1mk)	COOH ✓ ½ ROH Correct 2 – ½ mk 1 – 0mk Reject 'OH-
	(1mk)

b) i)

Observation	Inferences
Effervescence ✓ ½ (1mk)	RCOOH or - COOH ✓ ½ Reject H^+ (1mk)

ii)

Observation	Inferences
Pink KmO_4 ✓ ½ decolourized Reject KmO_4 decolourized (1mk)	$C = C -$ or $-C \equiv C -$ (Tied to correct air) (1mk)