

SERIES 35 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 0 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 $\text{MnO}_4^- = \frac{0.02 \times \text{Average titre}}{1000} \checkmark \frac{1}{2}$
- Moles of $\text{C}_2\text{O}_4^{2-} = \frac{\text{Answer I} \times 5}{2} \checkmark \frac{1}{2}$
- Correct Answer II $\checkmark \frac{1}{2}$
- ii) Moles of $\text{C}_2\text{O}_4^{2-} = \frac{\text{Correct answer II} \times 250}{25} \checkmark \frac{1}{2}$
- = Correct answer III $\checkmark \frac{1}{2}$
- ii) Moles of $\text{Na}_2\text{C}_2\text{O}_4$ in 50cm^3 of solution
 = $\frac{\text{Answer III} \times 50}{25} \checkmark \frac{1}{2}$
 = Correct Answer IV(iii) $\checkmark \frac{1}{2}$
- iii) Moles of NaC_2O_4 in 50cm^3 of water
 = Correct Answer IV x RFM(122) $\checkmark \frac{1}{2}$
- = Answer V
- Solubility of $\text{Na}_2\text{CO}_4 = \frac{\text{Answer V} \times 100}{50} \checkmark \frac{1}{2}$
 = 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 $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 condemned

-Colourless liquid condemned

- 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 ⁻ , 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)

Reject

- Wrong symbol check the 'O's 'C'
- Joining of symbols
- OH- if not mentioned in the b(i)

iii)

- 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 ≡ C – (1mk)
	Reject - Wrong symbols - Alkenes, ankyne in words

ii)

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

b) i)

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

ii)

Observation	Inferences
Pink KmnO_4 ✓ $\frac{1}{2}$ decolourized Reject KmO_4 decolourized (1mk)	$\text{C} = \text{C}-$ or $-\text{C} \equiv \text{C}-$ (Tied to correct air) (1mk)

