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)

Penalities

i) Wrong arithmetic
ii) Inverted table penalize ½ mk to maximum 1
iii) Unexplained readings beyond 50.0cm^3
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 litres 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 MnO^-_4 = $\underline{0.02 \text{ x Average titre}}$ ✓ ½

1000

Moles of $C_2O^{2-}_4$ = Answer I x $\frac{5}{2}$ ✓ ½

Correct Answer II ✓ ½

ii) Moles of $C_2O^{2-}_4$ = $\frac{\text{Correct answer II x 250}}{25}$ ✓ ½

= Correct answer III ✓ ½

ii) Moles of $Na_2C_2O^{2-}_4$ in $50cm^3$ of solution

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

= Correct Answer IV(iii) ✓ ½

iii) Moles of $NaC_2O^{2-}_4$ in $50cm_3$ of water

= Correct Answer IV x RFM(122) ✓ ½

= Answer V

Solubility of Na_2CO_4 = $\frac{\text{Answer V x 100}}{50}$ ✓ 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 condemned -Colourless liquid condemned

- influence is tied to correct observation i.e colourless liquid formed

b)

Observation	Inferences
-Colourless ✓ ½ filterate -White ✓ ½ residue (1mk)	-Compound ✓ ½ is sparingly soluble N/B - Accept the following tied to coloureless filterate 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 Ca^{2+}✓1 Ba^{2+}
- Joining of symbols
- Wrong symbols
- mark out out 1mk if there;s a contradiction
  Pb^{2+} or Al^{3+} 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, ankynes 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 $KmnO_4$ ✓ ½ decolourized **Reject** KmO_4 decolourized (1mk)	C = C- or –C ≡ C – (Tied to correct air) (1mk)