SERIES 18 EXAMS

CHEMISTRY
PAPER 3
MARKING SCHEME

1. 12 Marks
   Table I …. 5 Marks distributed as follows

I. Complete table ✓1
   (i) Complete table with 3 titrations done and consistent ✓1
   (ii) Incomplete table with 2 consistent titrations done ✓1
   (iii)Incomplete table with one titration done ✓0
   (iv) Complete table with 3 titrations done but inconsistency

PENALTIES

i. Wrong arithmetic/subtraction
ii. Inverted table
iii. Burette readings beyond $50cm^3$ unless where explained
iv. Unrealistic titre values i.e. below $1cm^3$ or above $50cm^3$.
   NB: Penalize ½ Mark each to a maximum if ½ Mark.

(II) Use of decimals ……. ✓1 Tied to 1st and 2nd rows.

Conditions
(i) 1 D.P used consistently ✓1
(ii) 2 D.P used consistently, the 2nd D.P must be O or 5 ✓1 Penalize fully if any of the conditions is NOT met.

(III): Accuracy….. ✓1 Compare any of the candidates's titre values with the school's litre values (Teacher's titre
values)
(i) If any is within ± 0.1 of Teacher's titre value.
(ii) If any within ± 0.2 of Teacher's titre value ✓ ½ (If condition 1 is not met)
(iii) None within ± 0.2 ✓0
NB: If there is wrong arithmetic in the table, compare the school value with the correct titre and award accordingly.

(IV) Principles of averaging ……✓1 values averaged must be consistent with ± 0.2 cm3 of each other.

Conditions

i. If three consistent values are averaged.
ii. If three titrations are done and only two are possible and averaged. } ✓1
iii. If only two titrations are done, consistent and averaged.
iv. Two inconsistent titrations averaged.
v. Three inconsistent titrations are done and averaged. } ✓0
vi. If three consistent titrations are done and only two averaged.

(V): Final answer ……. ✓1 compared to school average titre.

Conditions

i. Candidate's average titre within ± 0.1 cm3 of the school's average titre. ✓1
ii. Candidate's average titre within ± 0.2cm3 of the school's average titre. ✓ ½
iii. If candidate's average titre is beyond ±0.2cm3 of the school average titre √0
NB: Accept answer to 2 d.p otherwise penalise fully unless the answer works out to an exact figure.

CALCULATIONS

(b) (i) Grams per litre of NaOH $= \frac{1000\ x\ 2.36g}{500}$ ✓½
$= 4.72g$ ✓½

∴Molarity of NaOH $= \frac{4.72}{RmmNaOH}$
$= \frac{4.72}{40}$M ✓½
= 0.118m/moles per litre

Conditions

i. Penalise ½ m for wrong units used.
ii. Ignore if units are omitted.

b (ii) $H_2A_{(aq)} + 2NaOH_{(aq)} \longrightarrow Na_2A_{(aq)} + 2H_20_{(l)}$
Moles of NaOH used $= \frac{25\ x\ 0.118}{1000}$ ✓½
$= 0.00295$ ✓½
Acid : Base = 1 : 2
∴Moles of dibasic (H_2A) used = ½ x 0.00295 ✓½
$H_2A = 0.001475$ ✓½
NB: Penalize ½ mark for wrong transfer of answer.bi)

(b) (iii) Molarity of solution A $= \frac{1000\ x\ Ans\ b\ (ii)}{Ans\ (a)}$ ✓½
= Correct answer ✓½
Penalize ½ mk once for wrong transfer of answers in b (ii) and a)

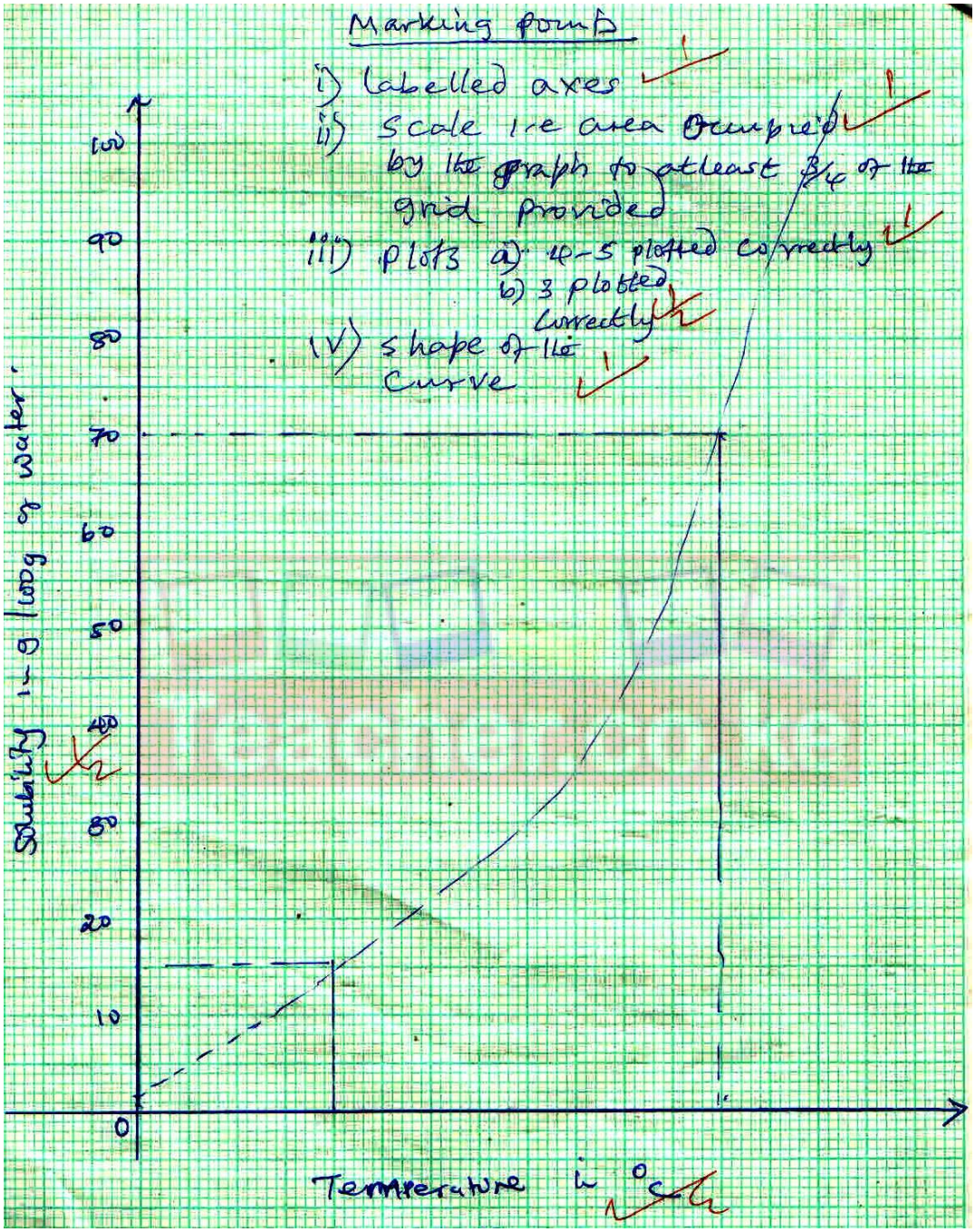
b (iv) Rmm of $H_2A = \frac{8.9}{Ans\ b\ (iii)}$ ✓½
= Correct answer ✓½
Penalties
i. Penalise ½ mark for wrong transfer of ans b (iii)
ii. Penalise ½ mark for the answer if outside the range 100≤ Rmm ≤ 130
(v) Rmm of H2A = Ans b (iv)
2 + A = Ans. B (iv) ✓½
A = Ans b (iv) – 2
= Correct answer ✓½

2. (i)

Volume of water in the boiling tube (cm^3)	Temperature at which crystals form (^oc)	Solubility of V in g/100g of water
4	✓½	✓½
6	✓½	✓½
8	✓½	✓½
10	✓½	✓½
12	✓½	✓½

→ Each blank space is ½ of a mark.
Total marks 5 Marks

2.(ii)



(ii) $85^0C \pm 2^0C$ ✓1

(iii) 12.5g/100g of water ± 1g

Conditions must be indicated in the graph in broken line.

Marking points

(i) Labelled axes ✓1

(ii) Scale i.e. area occupied by the graph to be atleast ¾ of the grid provided.

(iii) Plots (a) 4 -5 plotted correctly ✓1

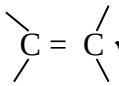
(b) 3 plotted correctly√ ½

(iv) Shape of the curve ✓1

3. I (17 MARKS)

	Observations	Inferences
(a)	Yellow/brown filtrate ✓ ½ OR Black residue	Fe^{3+} present ✓ ½ OR Cu^{2+} present
(i)	Brown precipitate ✓ ½ Insoluble in excess ✓ ½	Fe^{3+} Present ✓ ½
(ii)	Brown precipitate ✓ ½ Insoluble in excess ✓ ½	Fe^{2+} Present ✓ ½
(iii)	White precipitate formed ✓ ½	Cl^-, SO_4^{2-}, SO_3^{2-} , CO_3^{2-} Present NB: (i) 3 or 4 mentioned ✓1 (ii) 2 mentioned present ✓ ½ (iii)1 mentioned present ✓ 0
iv)	No white precipitate formed ✓ ½	CI - Present✓ ½
(b)	- Blue solution formed ✓ ½ OR - No effervescence bubbles	Cu^{2+} present ✓ ½ OR SO_3^{2-}/CO_3^{2-} absent
(i)	Blue precipitate ✓ ½ insoluble in excess ✓ ½	Cu^{2+} present✓ ½
(ii)	Blue precipitate ✓ ½ soluble in excess to form a deep blue solution ✓ ½	Cu^{2+} confirmed present ✓ ½

(II)

	Observations	Inferences
(a)	- Yellow/sooty flame ✓ ½/ Smoky flame	Either  ✓ ½ OR - C ≡ C – Present
(b) (i)	$K_2Cr_2O_7$ is not decolourised ✓1	Either RCOOH ✓ ½ OR H_30^+ present
(ii)	Bromine water ✓ 1 is not discolourised	- RCOOH present ✓ ½
(iii)	PH = 5 – 6.5 ✓ ½	- Weakly acidic - Either H_30+, H+ ✓ ½ OR RCOOH present
(iv)	Effervescence/bubbling/fizzling ✓ 1	RCOOH confirmed present✓ ½