P525/3 CHEMISTRY MARKING GUIDE

Qn 1: PART A:

Volume of pipette = 25.0 ~~/~~ 25 / 25.00 cm^3 ✓

TABLE I

Final burrete reading (cm^3)	25.20 ✓	26.30 ✓	30.70 ✓
Initial burette reading (cm^3)	0.00 ✓	1.20 ✓	5.60 ✓
Volume of FAI used (cm^3)	25.20 ✓	25.10 ✓	25.10 ✓

- Table filled to 2dplc, with correct subtraction, award
- Deny ½ mark for every wrong subtraction.
- Deny ½ mark for each value recorded to 1dplc up to a maximum of 1½ marks.
- For a table filled to whole numbers, award ze
- Deny ~~any~~ marks for any value above 50mls.
- If final reddings are less than initial reading award only 1½ marks for initial readings.

Titre Values used in Calculating average volume of FAI = 25.10, 25.10 cm^3 ✓

'Reject values which differ by more than 0.1

Average volume of FAI used:

$= \frac{25.10 + 25.10}{2}$ ✓✓

$= 25.10\ cm^3 \pm 0.1$ ✗ → (2½ Marks)

± 0.2 → (2 Marks)

± 0.3 → (1½ Marks)

± 0.4 → (1 Mark)

± 0.5 (½ Mark).

$>$ or < 0.5 (0).

QUESTIONS:

(i) RFM of $H_2C_2O_4 \cdot 2H_2O = (1\times2) + (12\times2) + (16\times4)$

$= 126$ ✓✗

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Molarity of FA2 = $\frac{6.3}{126}$ ✓ ✗

= 0.05M ✓

1000 cm³ of FA2 Contain 0.05 moles of $C_2O_4^{2-}$

25 cm³ of FA2 Contain $\frac{0.05 \times 25}{1000}$ moles ✓

= 1.25×10^{-3} moles ✓

① 5 moles of $C_2O_4^{2-}$ react with 2 moles of MnO_4^-

1.25×10^{-3} moles of $C_2O_4^{2-}$ react with $\frac{2 \times 1.25 \times 10^{-3}}{5}$ ✓ ✗

$= 5.0 \times 10^{-4}$ Moles

25 cm³ of FA1 Contain 5.0×10^{-4} Moles of FA1

1000 cm³ of FA1 Contain $\frac{5.0 \times 10^{-4} \times 1000}{25.1}$ ✓

= 0.0199 moles

∴ Molarity of FA1 = 0.0199M ✓

PART B:

Mass of Weighing container = 44.60g ✓

Mass of Weighing container = 39.40g ✓

Mass of T used = 5.20g ✓

Accept Masses recorded 1dpl.

Volume of pipette used = 25.0/25/25.00cm ✓

Table II:

Final burette reading (cm^3)	13.30	26.50	39.70
Initial burette reading (cm^3)	0.00	13.30	26.50
Volume of FAI used (cm^3)	13.30	13.20	13.20

As for Table I.

Titre values used in Calculating averal volume of FAI = 13.20, 13.20 cm^3 ✓

Average volume of FAI used:

$$\frac{13.20 + 13.20}{2}$$

$$= 13.20\ cm^3$$ ✓

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(ii) PERCENTAGE OF IRON IN T:

1000 cm^3 of FA3 Contain 0.0525 Moles of F

250 cm^3 of FA3 Contain $\frac{0.0525 \times 250}{1000}$ ✓

$= 0.013125$ Mole

Molar Mass of Fe = 56g.

1 Mole of Fe Weighs 56g ✓

0.013125 Moles of Fe Weigh 0.013125×56 ✓

$= 0.735g$ ✓

Percentage of Fe = $\frac{0.735}{5.2} \times 1000$ ✓

$= 14.13\%$ ✓

NB: • Deny Marks for Mass and percentage of F if a Candidate was outside accuracy range in Tables I & II (or Table I alone or Table II

TOTAL = 30M

Pn2:

OBSERVATIONS	DEDUCTIONS
(a) White fumes that turn red litmus to blue and form dense white fumes with concentrated hydrochloric acid.	NH_3 gas, hence NH_4^+
Colourless liquid that turns anhydrous copper(II) sulphate blue.	Water of crystallisation hence hydrated salt.
Colourless gas that turns blue litmus red and acidified potassium dichromate (VI) solution from orange to green.	SO_2 gas; hence SO_3^{2-}, SO_4^{2-}.
White residue.	Al_2O_3 / MgO, BaO, $\therefore Al^{3+}$, Mg^{2+}, Ba^{2+},
(b) Dissolves to give a green solution.	Ni^{2+}, Cr^{3+}, Fe^{2+}, Cu^{2+}
Green precipitate insoluble in excess NaOH(aq).	Fe^{2+}, Ni^{2+}
Colourless filtrate.	Al^{3+}, Pb^{2+}, Zn^{2+}, Sn^{2+}, Sn^{4+}
Green residue.	Fe^{2+}, Ni^{2+}
Colourless gas that turns red litmus blue and forms dense white fumes with concentrated hydrochloric acid.	NH_3 gas; NH_4^+ confirmed.

Ma (6)

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(c) White precipitate ✓ soluble ✗ ✓		Al^{3+} ✓, Zn^{2+} ✗, Pb^{2+} ✗ Sn^{2+}, Sn^{4+} (Any correct two)	(0)
(i) White precipitate ✗ soluble in excess. ✓		Al^{3+} ✓, Zn^{2+} ✗, Pb^{2+} ✗ Sn^{2+}, Sn^{4+}. (Any correct two)	(0)
Colourless gas that turns red litmus to blue and forms dense white fumes ✓ with concentrated hydrochloric acid.		NH_3 gas ∴ NH_4^+ present	
(ii) White precipitate ✗ ✓ insoluble ✗ ✓		Pb^{2+} ✗ ..., Al^{3+} ✗, Sn^{2+}, Sn^{4+}.	(0)
(iii) No Observable Change. ✗ ✓		Pb^{2+} ✓ absent. ∴ Al^{3+} ✓, Sn^{2+}, Sn^{4+} probably present.	(1½)
(iv) To the fourth part, add 3 drops of litmus solution ✓ followed by dilute ammonia solution drop-wise until in excess. ✗ ✓	Blue ✗ ✓ Solution/ Blue lake	Al^{3+} ✓ Confirmed.	(1½)
(v) White precipitate. ✗ ✓		SO_4^{2-} ✗ ✓, Cl^- ✗ ✓. • Reject CO_3^{2-} or SO_3^{2-}	(1½)
(vi) Add 3 drops of ... solution ✗	White ✗ ppt	SO_4^{2-} ✓ Confirmed	(1½)

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(d) Residue dissolves to form a green solution.		Ni^{2+}, Fe^{2+} probably present. • Reject Cr^{3+} or Cu^{2+}	(1/2)
(i) Green precipitate, insoluble.		Ni^{2+}, Fe^{2+}	(04)
(ii) Green precipitate soluble to form a pale-blue solution.		Ni^{2+} probably present.	
(iii) Add aqueous ammonia solution followed by 3 drops of dimethyl glyoxime solution	A red ppt	Ni^{2+} Confirmed	(1/2)

(d) (i) Cations in R are: Al^{3+}, Ni^{2+}, NH_4^+ (02)

(ii) Anions in R is: SO_4^{2-}

TOTAL = 33 M

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Q n 3:

OBSERVATIONS	DEDUCTIONS
(a) Burns with a yellow sooty flame.	Aromatic Comp or Unsaturated aliphatic Comp or Aliphatic Com with high C:H
(b) Dissolves in water to form a colourless solution. The solution formed has no effect on litmus.	Polar aliphatic Compound of low Molecular Mass. Neutral Compo probably alcoh Carbonyl or e
(i) No observable Change. OR No effervescence.	Carboxylic ac absent.
(ii) No Observable Change.	Phenol absent
(iii) No observable Change.	Carbonyl Comp absent. (OR ketone, aldehyde a
(iv) No Observable Change.	Primary alcohol Secondary alcoh absent.

(C) Purple colour of potassium Manganate(VII) turns to Colourless.	Alkene formed from an alcohol & ALCohol dehydrated to an alkene.	(02)
(d) Sweet fruity Smell.	Ester formed hence alcohol present.	(02)
(e) Cloudy solution formed immediately.	Tertiary alcohol present	(02)

(f) COMMENT:

W is aliphatic tertiary alcohol. (1½)

TOTAL = 17MKS

Qn1: 30

Qn2: 33

Qn3: 17

TOTAL = 80MKS

QUESTIONS:

(i) MOLARITY OF Fe^{2+} IN FA3:

$1000cm^3$ of FA1 Contain 0.0199 Moles of MnO_4^-

$13.2\ cm^3$ of FA1 Contain $\frac{0.0199 \times 13.2}{1000}$ moles ✓

$= 2.6268 \times 10^{-4}$ Moles

$MnO_{4(aq)}^- + 8H_{(aq)}^+ + 5Fe_{(aq)}^{2+} \longrightarrow Mn_{(aq)}^{2+} + 4H_2O_{(l)} + 5Fe^{3+}$

Reaction Mole ratio $MnO_4^- : Fe^{2+} = 1:5$

1 Mole of $MnO_{4(aq)}^-$ react with 5 Moles of $Fe_{(aq)}^{2+}$ ✓

$\therefore 2.6268 \times 10^{-4}$ Moles of MnO_4^- react with $5 \times 2.6268 \times$ (O

$= 1.3134 \times 10^{-3}$ moles ✓

$25.0cm^3$ of FA3 Contain 1.3134×10^{-3} moles of Fe ✓

$\therefore 1000cm^3$ of FA3 Contain $\frac{1.3134 \times 10^{-3} \times 1000}{25.0}$ mo

$= 0.0525$ Mole ✓

Molarity of Fe^{2+} in FA3 = 0.0525 M ✓

NB Deny mark for Molarity if a candidate was outside the accuracy range in Table I & II for Table II