Question	Marking Guidance	Mark	Comments
6(a)	Co-ordinate / dative / dative covalent / dative co-ordinate	1	Do not allow covalent alone
6(b)	(lone) pair of electrons on <u>oxygen/O</u> forms co-ordinate bond with <u>Fe</u> / donates electron pair to <u>Fe</u>	1 1	If co-ordination to O^{2-}, CE=0 'Pair of electrons on O donated to Fe' scores M1 and M2
6(c)	180° / 180 / 90	1	Allow any angle between 85 and 95 Do not allow 120 or any other incorrect angle Ignore units eg ^{o}C
6(d)(i)	3 : 5 / 5 FeC_2O_4 reacts with 3 MnO_4^-	1	Can be equation showing correct ratio

6(d)(ii)	**M1** Moles of MnO_4^- per titration = $22.35 \times 0.0193/1000 = \underline{4.31 \times 10^{-4}}$ Method marks for each of the next steps (no arithmetic error allowed for M2): **M2** moles of FeC_2O_4= ratio from (d)(i) used correctly $\times 4.31 \times 10^{-4}$ **M3** moles of FeC_2O_4 in 250 cm^3 = M2 ans $\times$ 10 **M4** Mass of $FeC_2O_4.2H_2O$ = M3 ans $\times$ 179.8 **M5** % of $FeC_2O_4.2H_2O$ = (M4 ans/1.381) $\times$ 100 (OR for M4 max moles of $FeC_2O_4.2H_2O$ = 1.381/179.8 (= 7.68×10^{-3}) for M5 % of $FeC_2O_4.2H_2O$ = (M3 ans/above M4ans) $\times$ 100) eg using correct ratio 5/3: Moles of $FeC_2O_4 = 5/3 \times 4.31 \times 10^{-4} = 7.19 \times 10^{-4}$ Moles of FeC_2O_4 in 250 $cm^3 = 7.19 \times 10^{-4} \times 10 = 7.19 \times 10^{-3}$ Mass of $FeC_2O_4.2H_2O = 7.19 \times 10^{-3} \times 179.8 = 1.29$ g % of $FeC_2O_4.2H_2O$ = $1.29 \times 100/1.381 = 93.4$ (allow 92.4 to 94.4) Note correct answer (92.4 to 94.4) scores 5 marks	1 1 1 1 1	Allow $\underline{4.3 \times 10^{-4}}$ (2 sig figs) Allow other ratios as follows: eg from given ratio of 7/3 **M2** = $7/3 \times 4.31 \times 10^{-4} = 1.006 \times 10^{-3}$ **M3** = $1.006 \times 10^{-3} \times 10 = 1.006 \times 10^{-2}$ **M4** = $1.006 \times 10^{-2} \times 179.8 = 1.81$ g **M5** = $1.81 \times 100/1.381 = 131$ % (130 to 132) Allow consequentially on candidates ratio eg **M2** = $5/2 \times 4.31 \times 10^{-4} = 1.078 \times 10^{-3}$ **M3** = $1.0078 \times 10^{-3} \times 10 = 1.078 \times 10^{-2}$ **M4** = $1.078 \times 10^{-2} \times 179.8 = 1.94$ g **M5** = $1.94 \times 100/1.381 = 140$ % (139 to 141) Other ratios give the following final % values 1:1 gives 56.1% (55.6 to 56.6) 5:1 gives 281% (278 to 284) 5:4 gives 70.2% (69.2 to 71.2)