

Marks
9

- Complete the following table. (en = ethylenediamine = $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$)

Formula	$(\text{NH}_4)_2[\text{CoCl}_4]$	$[\text{Cr}(\text{NH}_3)_5(\text{H}_2\text{O})]\text{Cl}_3$	<i>cis</i> - $[\text{PtCl}_2(\text{en})_2]$
Oxidation state of transition metal ion	+2 (II)	+3 (III)	+2 (II)
Coordination number of transition metal ion	4	6	6 (2 × Cl and 4 × N from 2en)
Number of <i>d</i> -electrons in the transition metal ion	7 (Co is in Group 9 so Co^{2+} has 9 – 2 = 7)	3 (Cr is in Group 6 so Co^{2+} has 6 – 3 = 3)	8 (Pt is in Group 10 so Pt^{2+} has 10 – 2 = 8)
Charge of the complex ion	-2 $[\text{CoCl}_4]^{2-}$	+3 $[\text{Cr}(\text{NH}_3)_5(\text{OH}_2)]^{3+}$	0 $[\text{PtCl}_2(\text{en})]$
Geometry of the complex ion	tetrahedral	octahedral	octahedral
List all the ligand donor atoms	4 × Cl⁻	5 × N and 1 × O	2 × Cl⁻ and 4 × N