

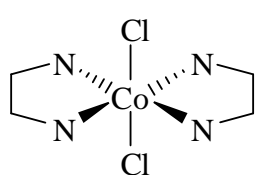
Marks
4

- What is a chelate ligand?

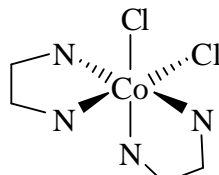
A chelate is a ligand with more than one donor atom that can bond to the same metal ion.

Draw all possible isomers of $[\text{CoCl}_2(\text{en})_2]$. en = ethylenediamine = $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$

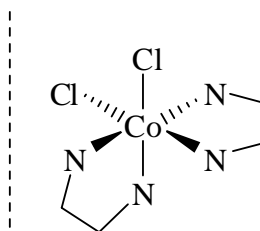
***cis* and *trans* geometric isomers are possible. The *cis*-isomer can exist as non-superimposable mirror images (enantiomers).**



trans-



cis-



cis-

- Explain briefly why the $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ cation has a K_a of 6×10^{-3} M, whilst the $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ cation has a K_a of 4×10^{-9} M.

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The Fe^{3+} ion has a higher charge and is smaller than the Fe^{2+} ion – it has a higher charge density. The higher charge density withdraws electron density from the oxygen and leading to a more polarised O–H bonds that are more easily broken.