Octahedral Complexes

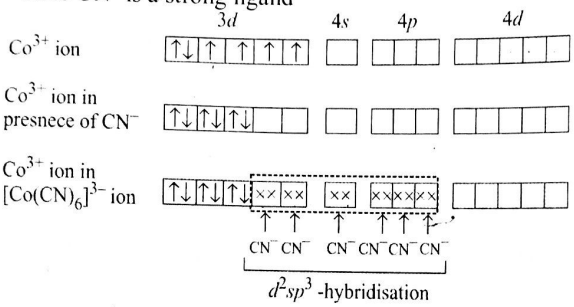
There are two types of octahedral complexes
(1) Inner orbital octahedral complexes
(2) Outer orbital octahedral complexes

(1) Inner Orbital Octahedral Complexes

The complexes in which two $(n-1)^{th}$ d-orbitals, one n^{th} s and three n^{th} p orbials participate hybridisation giving rise to d^2sp^3 hybridisation are called inner orbital octahedral complexes. these complexes the unpaired electrons in the metal ion have been forced to pair up and so the complexes are also called low spin or spin paired complexes. Pairing of electrons takes pla according to Hund's rule. A low spin complex is one in which the d-electrons are paired up to gi maximum number of doubly occupied d-electrons and a minimum number of unpaired electron These complexes, in general, are formed in the presence of strong ligands. The energy of d^2sp orbitals is quite small, so these complexes are more stable than the outer orbital complexes.

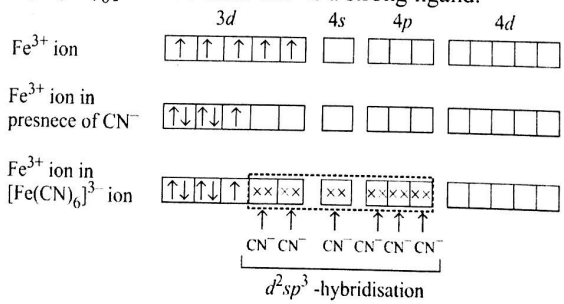
Example of Inner Orbital Complexes

(1) Here CN^- is a strong ligand

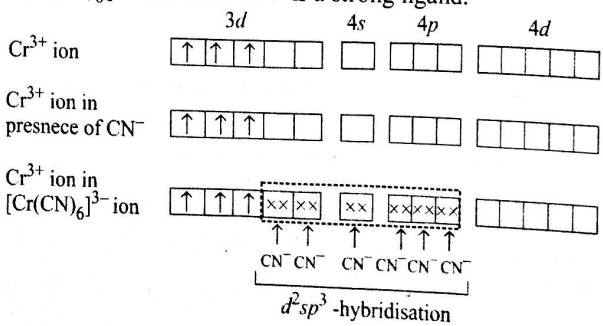


(2) $[Fe(CN)_6]^{4-}$ **ion :** Same as in example (1) of $[Co(CN)_6]^{3-}$ ion.

(3) $[Fe(CN)_6]^{3-}$ **ion :** Here CN^- is a strong ligand.



(4) $[Cr(CN)_6]^{3-}$ ion: Here CN^- is a strong ligand.



5) $[V(NH_3)_6]^{3+}$ ion : Here NH_3 is a ~~strong~~ weak ligand.