

Stereochemistry of Coordination compounds.

Coordination No. 2 $\rightarrow$ Two possible arrangements

Linear

Bent

Linear $\rightarrow$ When the central ion utilises the two hybrid orbitals for bonding with the ligands and does not contain any lone pair of electrons.

e.g. Complexes of Cu(I), Au(I), Ag(I)
 $[CuCl_2]^-$, $[Au(CN)_2]^-$, $[Ag(NH_3)_2]^+$ etc.

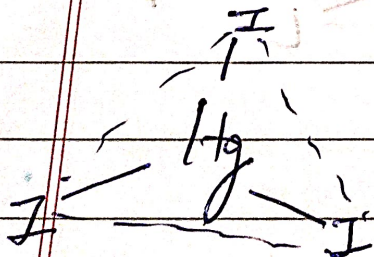
Bent $\rightarrow$ When the central ion utilises, apart from the two hybrid orbitals, one or more additional hybrid orbitals for accommodating lone pairs of electrons, it forms bent complexes.

Complexes having non-linear arrangements are rare.

Coordination No. 3 $\rightarrow$

bis(trimethylphosphine)sulphide) copper(I) perchlorate,
 $[Cu(SP(CH_3)_3)_3]^+ [ClO_4]^-$

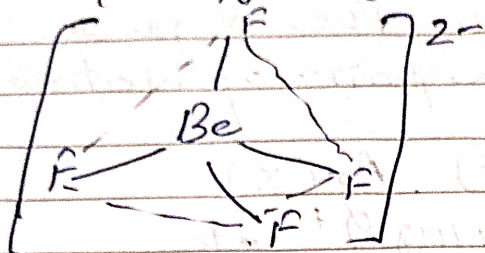
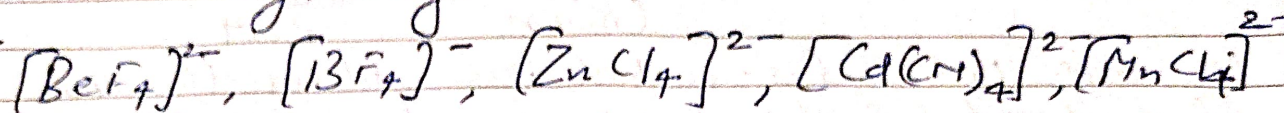
bis(diphenylphosphine) platinum(0), $[(C_6H_5)_3P]_3 Pt$
triodomercurate (II) anion $[HgI_3]^-$



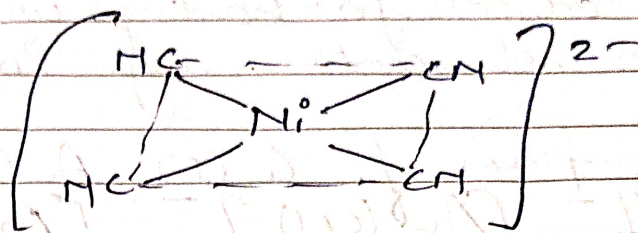
Trigonal
Planar.

Coordination No. 4 $\begin{cases} \rightarrow \text{Tetrahedral} \\ \rightarrow \text{Square planar} \end{cases}$

① Tetrahedral geometry.

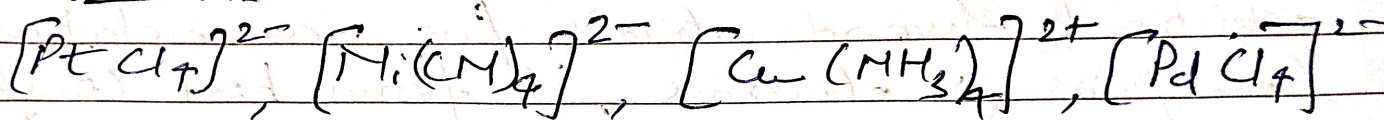


Tetrahedral

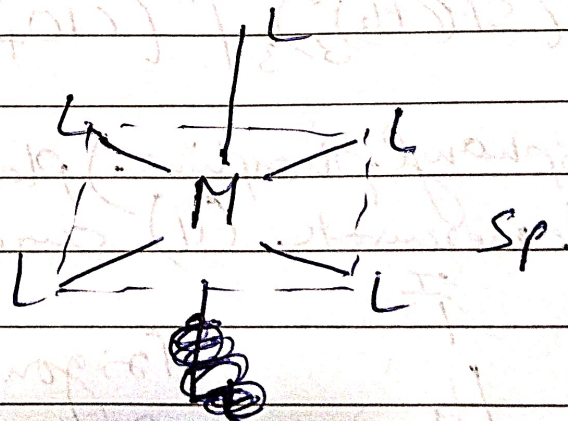
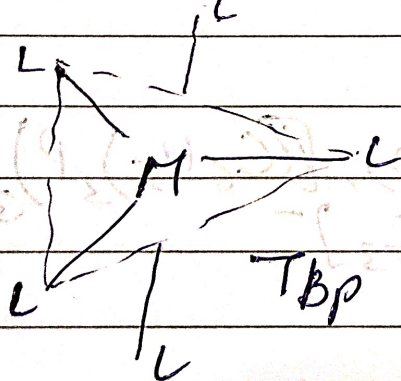
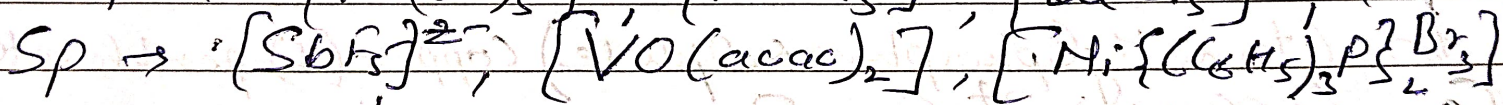
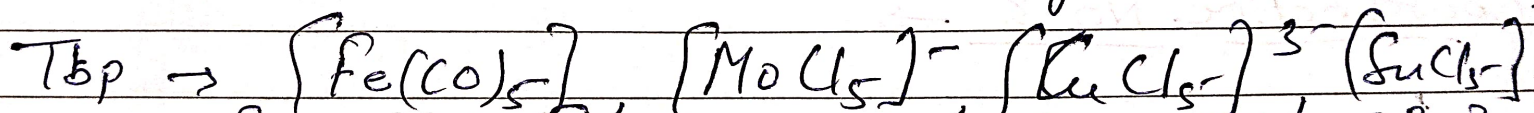


Square planar

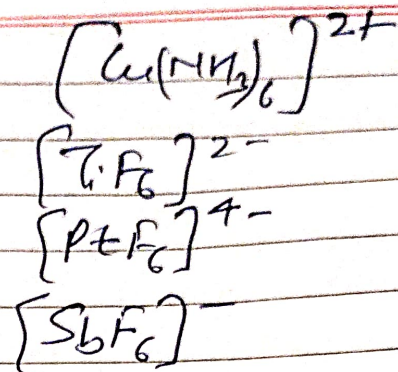
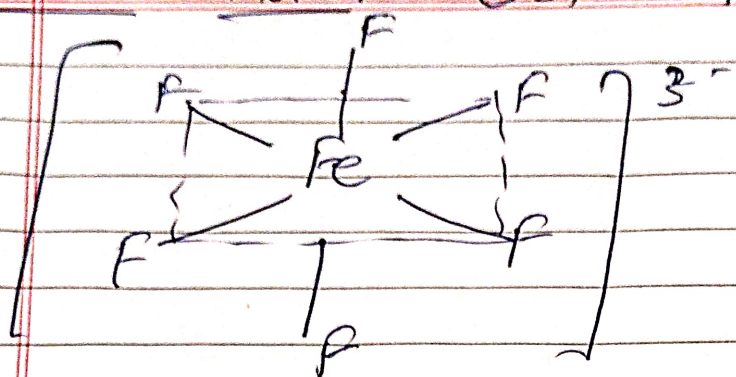
② Square planar



Coordination No. 5 $\begin{cases} \rightarrow \text{Trigonal bipyramidal (Tbp)} \\ \rightarrow \text{Square pyramidal (Sp)} \end{cases}$



Coordination No. 6. Octahedron



Coordination No. 7. → pentagonal bipyramidal $[UO_2F_5]^{3-}$
 → distorted octahedron $[NbOF_6]^{3-}$
 → trigonal prism. $[TaF_7]^{2-}$

Coordination No. 8. → Cubic $[UF_8]^{3-}$
 → Square antiprism $[TaF_8]^{3-}$ $[ReF_8]^{2-}$
 → Dodecahedral $[Mo(CN)_8]^{4-}$ $[Zr(ox)_4]^{4-}$

Coordination No. 9. $[Nd(BrO_3)_3] \cdot 9H_2O$