

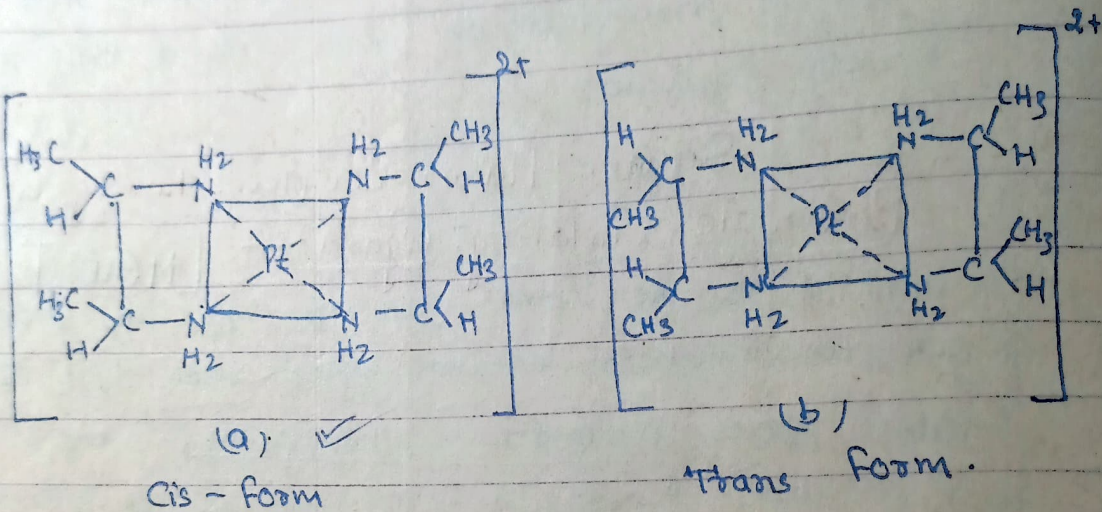
Square Planar Complexes having Symmetrical bidentate Chelating ligands: $[M(AA)_2]^{n\pm}$ type Complexes.

Such type of Complexes also shows cis and trans isomers.

Example: - $[Pt^{II} (NH_2 \cdot CH(CH_3) \cdot CH(CH_3) \cdot NH_2)_2]^+$ is an important example of this type of Complex.

The cis and Trans form of this Complex

is shown below:—



Optical ISOMERISM IN CO-ORDINATION - 4

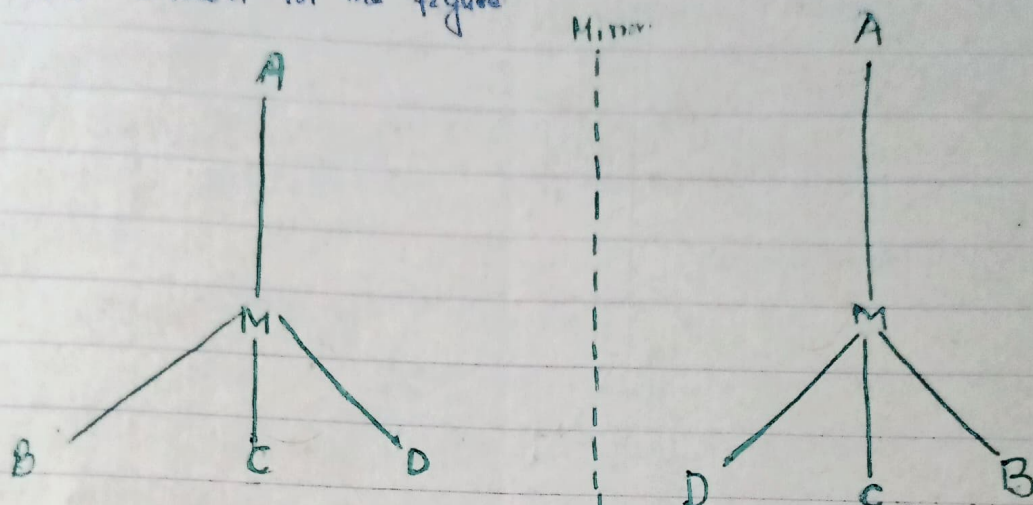
In tetrahedral and Square Planar Complexes of the type $[MA_4]^{n\pm}$, $[MA_3B]^{n\pm}$ and $[MAB_3]^{n\pm}$, the Stereo-~~Chem~~ isomerism is not possible, it is due to the fact that all the possible arrangements of the ligands around the central metal ion, M, are exactly equivalent.

(i) Square Planar Complexes: $\rightarrow$

The Square Planar Complexes rarely shows Optical isomerism.

(ii) Tetrahedral Complexes: $\rightarrow$ Optical isomerism is expected in a asymmetric molecule with tetrahedral structure.

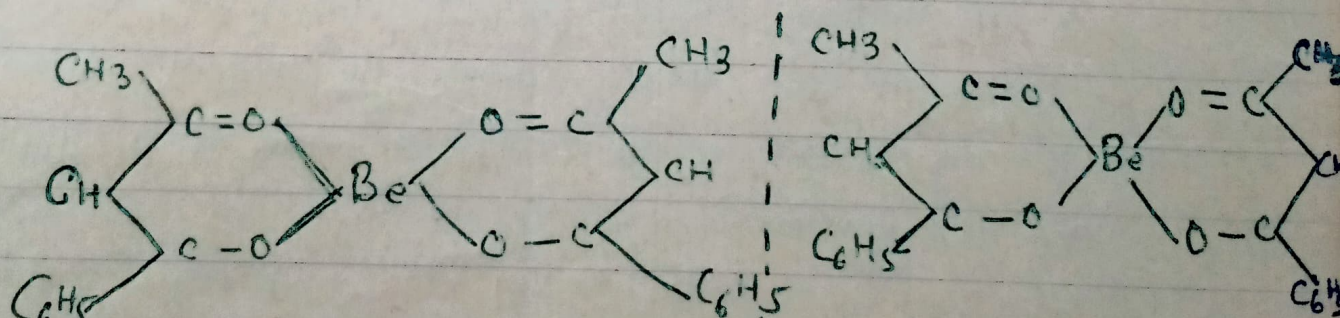
Where the central atom is surrounded by four different ligands $[MABCD]$. Two optical isomers (mirror-images) are shown in the figure



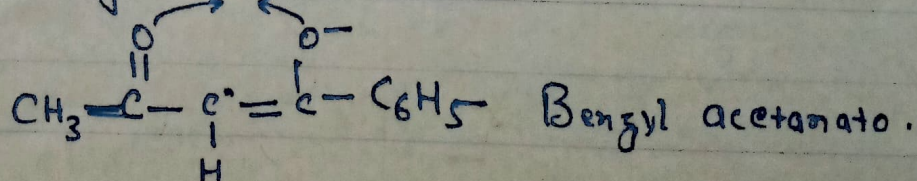
The first complex of this type $[As^{III}(CH_3)_2C_2H_5S(C_6H_5COO)]^{2+}$ was reported in 1963 but it could not be resolved.

However compounds containing two bidentate ligands are easy to resolve into optical isomers and are known for complex of $Be(II)$, $Zn(II)$, and $B(III)$.

The compound bis benzoyl acetato beryllium II exhibits the following two enantiomers.

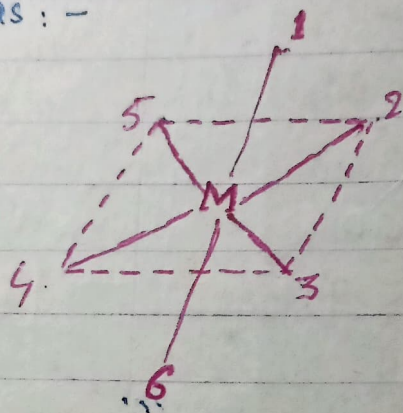


The ligand in this case is



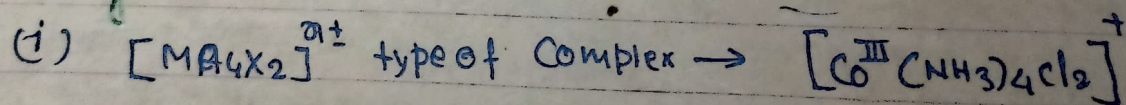
The arrangement of six ligands in a six-co-ordination complex compound is octahedral, although large distortions are frequently found when the arrangement changes to tetragonal.

The arrangement of six ligands in a regular octahedral complex round the central metal ion, M, can be represented as: -



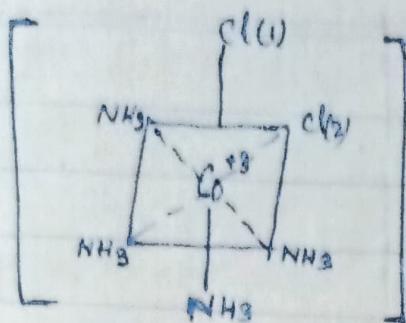
The following types of octahedral complexes show cis-trans isomerism.

(a) Octahedral complexes containing only monodentate ligands: →

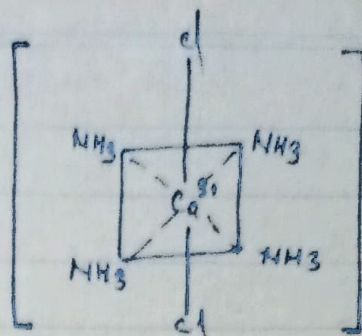


is an important example of this type. This cation has cis and trans isomers. In cis-isomer the two Cl^- ions are in any two adjacent position and hence it is designated as 1,2-isomers.

In trans isomer the two Cl^- ions are placed in opposite side or position, and such it is designated as 1,6-isomer.



Cis - Isomer
(Violet)

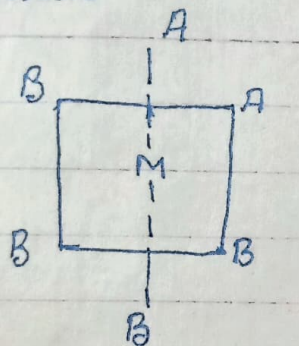


Trans form Isomer
Purple (Green)

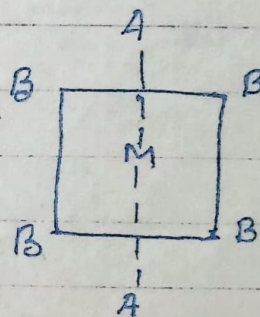
(b) Complex of type $[MA_2B_4]^{n+}$

The complexes of type MA_2B_4 exist in two geometrical forms although structures of such isomers have been not fully established as yet.

Two possible isomers for compounds of such type are possible.



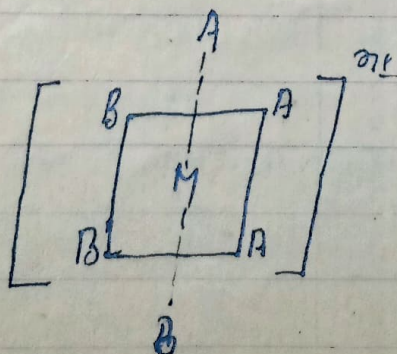
Cis form.



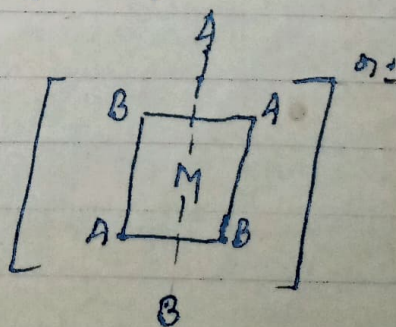
Trans form.

(c) The complexes of type $[MA_3B_3]^{n+}$ →

The complexes of the type $[MA_3B_3]^{n+}$ exist in cis and trans form of isomer as shown in figure given below.



Cis form



Trans form.