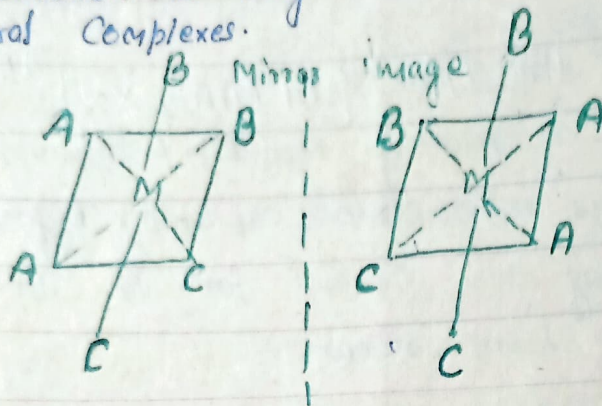


Optical Isomerism In 6-Coordination Compound.

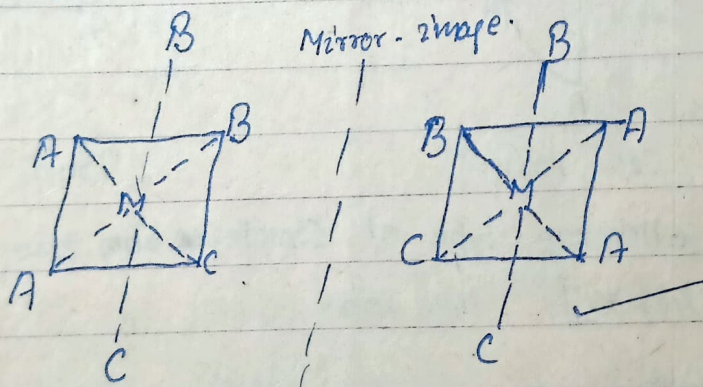
Optical isomerism is ^{also possible} very common in Co-ordination Number six this isomerism is very common in the following type of Octahedral Complexes.



1. Octahedral Complexes Containing only monodentate ligands

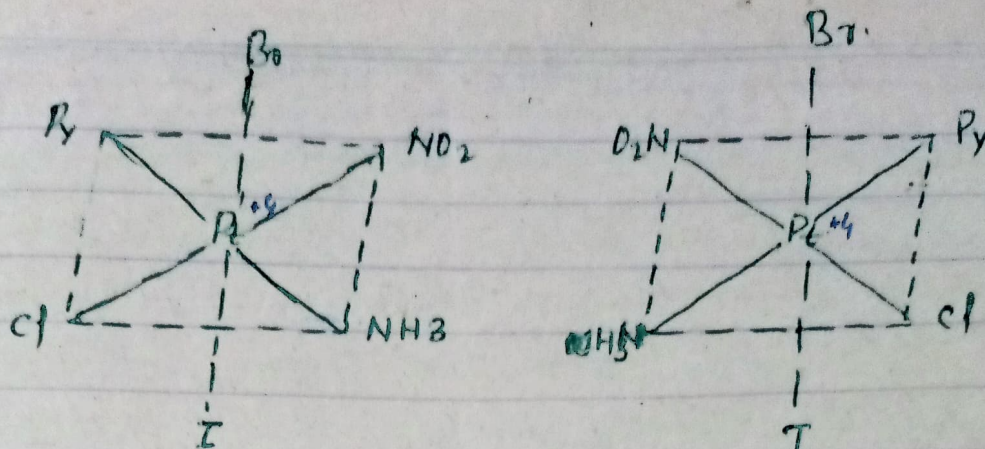
(a) Complex of type $[MA_2B_2C_2] \rightarrow$

This type of Complex shows two optical isomers as shown below.



(b) Complex of type $[MABCDEF] \rightarrow$ The Complex containing six different ligands, the central metal is unsymmetrically disposed. This type of Octahedral Complex can exist in 15, different geometrical isomers. Each of them ~~are~~ also possess optical isomerism, i.e. (d- and l-form). Hence the Total optical isomers are 30.

Thus for one form of $[Pt^{IV}(A_2)(NH_3)(NO_2)(Cl)(Br)]$ the two optical isomers are shown below. —

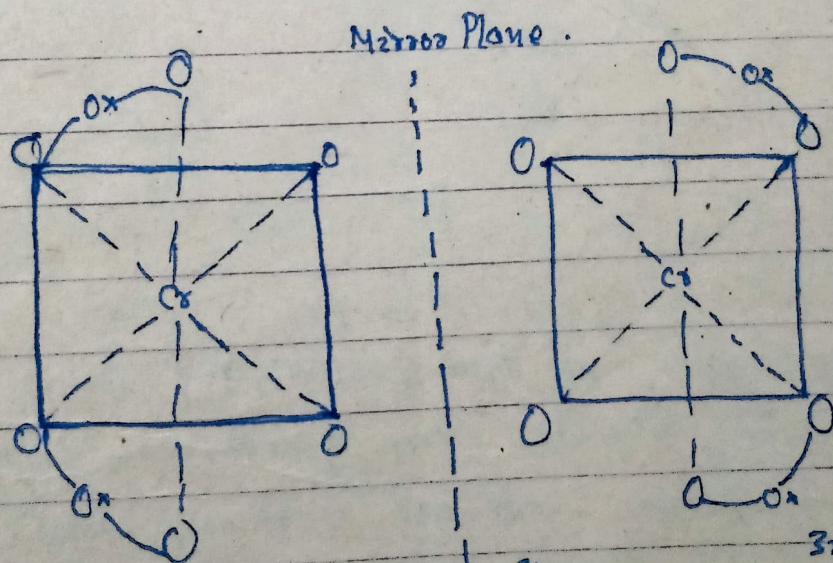


However the resolution of a complex of this type has not been possible.

2. Octahedral Complexes Containing only Symmetrical didentate Chelating Ligands:—

(A) The complex of the type $[M(AA)_3]^{n\pm}$ (where AA is symmetrical bidentate chelating ligand) also have optical isomers.

For example, the optical isomers of $[Co(en)_3]^{3+}$ are shown in the fig. given below.



Other examples are $[Co(en)_3]^{3+}$, $[Co(en)_3]^{3+}$, $[Pt(en)_3]^{4+}$ and $[Cd(en)_3]^{2+}$

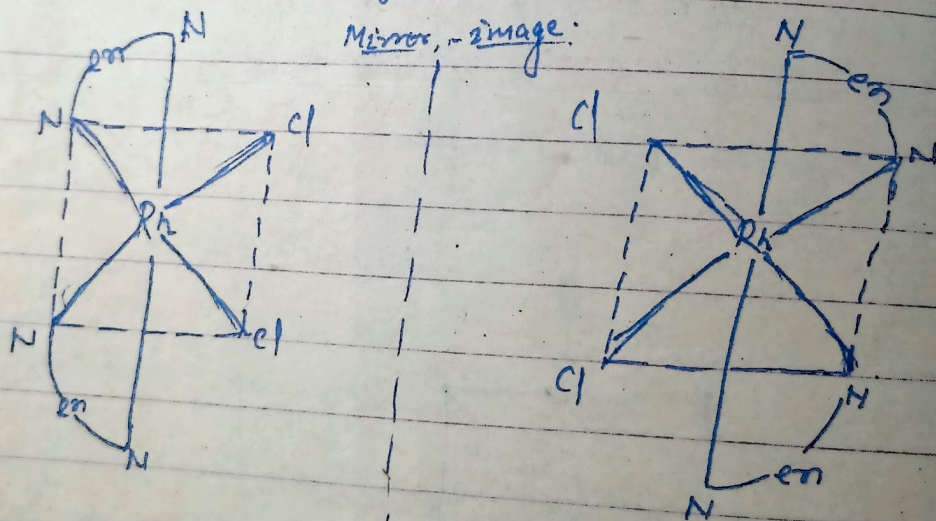
(b) The complexes of the type $[M(AA)_2(BB)]^{n\pm}$ have two optical isomers. Some examples are $[Co(en)_2CO_3]^+$ and $[Co(en)_2(C_2O_4)]^{2+}$.

3. Octahedral Complexes containing monodentate and symmetrical bidentate chelating ligands: —

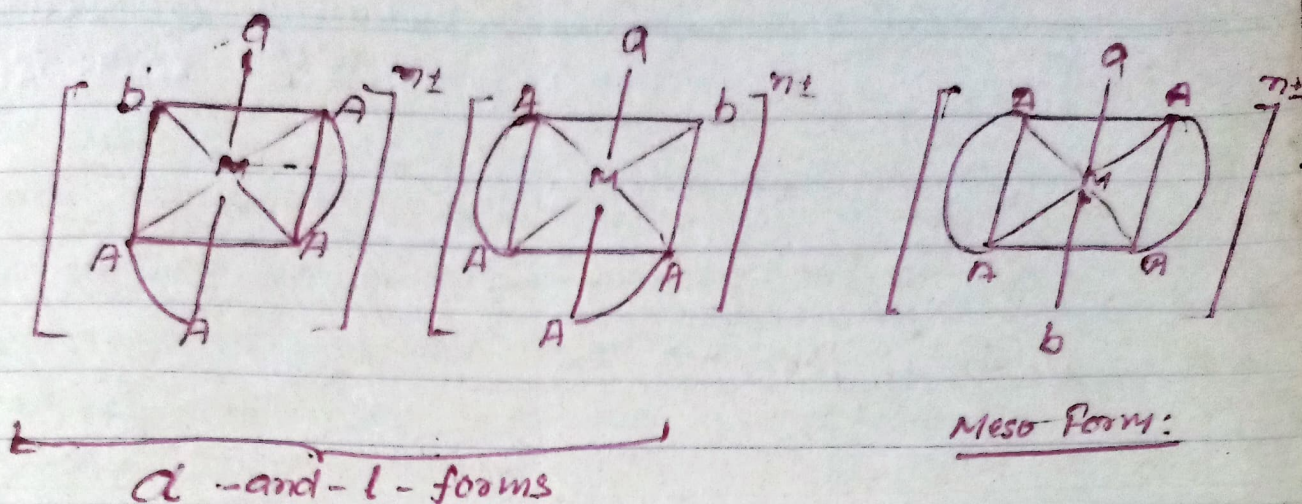
(a) The complexes of the type $[M(AA)_2A_2]^{n\pm}$ (where AA is bidentate chelating ligand and A is unidentate ligand) show optical isomerism.

An interesting example of this type of complex is dichloro, bis(ethylenediamine) rhodium(III).

This type of complex exist in two optical isomers shown in figure.



(b) The complexes of type $[M(AA)_2ab]^{n\pm}$ (where AA is bidentate ligand and a and b are monodentate ligand), exist in three forms; two are optically active (i.e. d and l form) and the third one is inactive (meso-form). The three isomers are shown in fig.



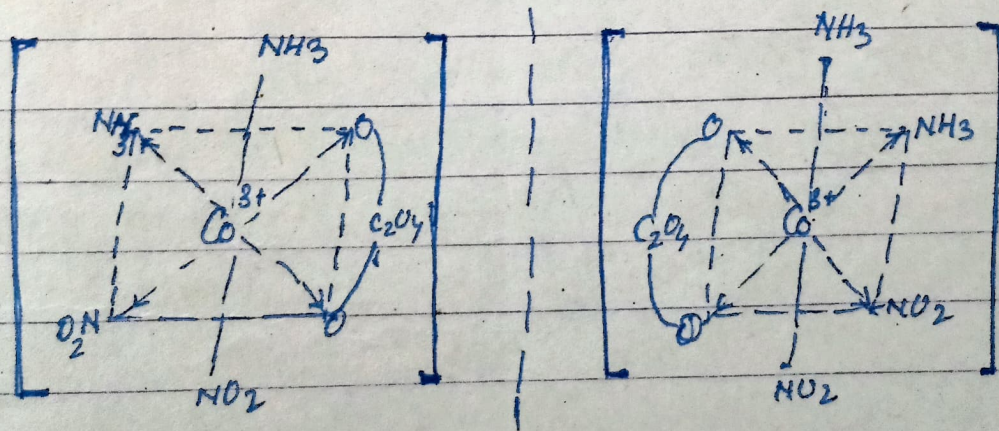
(c) $[M(AA)2b2]$ type Complex $\rightarrow$

These also exist in three forms: The two forms are optically active and the third is inactive or symmetrical.

Examples of these type of complexes are given below.

$[Co^{III}(en)(NH_3)_2Cl_2]^+$, $[Co^{III}(C_2O_4)(NH_3)_2(NO_2)_2]^-$ etc.
as shown in figure.

Mirror Plane



d- cis form

l- cis form

d and l Forms of cis- isomer of $[Co^{III}(C_2O_4)(NH_3)_2(NO_2)_2]^-$

These are unsymmetrical forms and hence are optically active.