STEREOCHEMISTRY

Degree-II(H) , Paper-IV , Lecture-7

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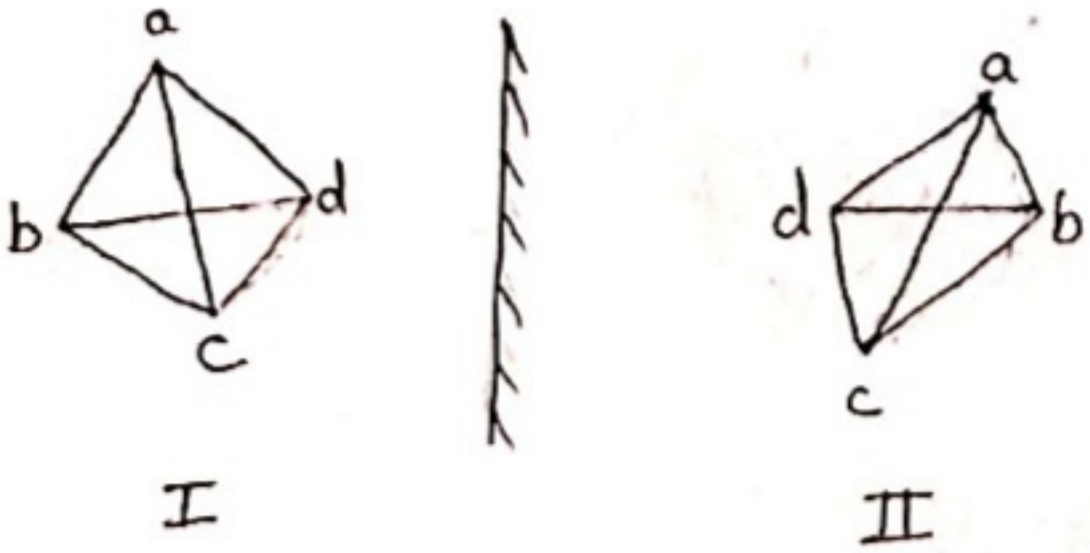
Optical Isomerism Continue..

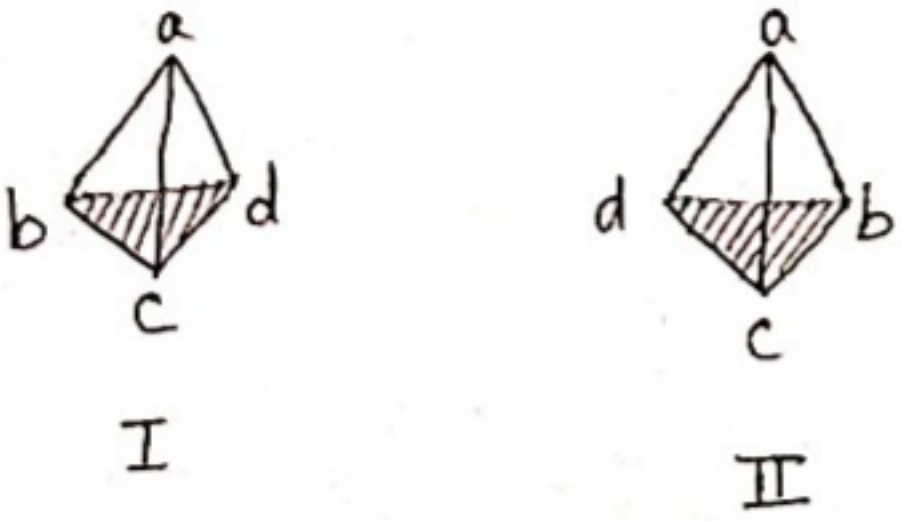
Optical Isomerism Due To Chiral Carbon Atom

In such cases two different structural arrangement are possible both of which are the non-superimposable images of each other.

eg, Cabcd will have two structural arrangement



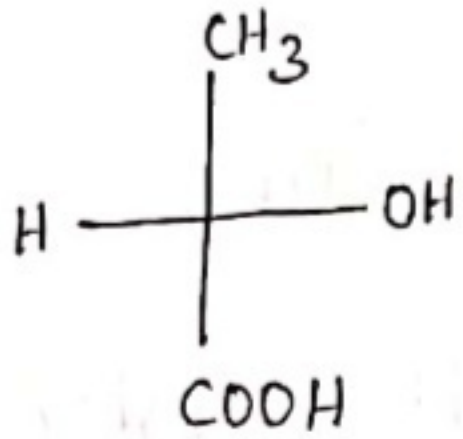
Or



As soon as the two or more atoms become similar, the carbon atom loses its asymmetry and hence

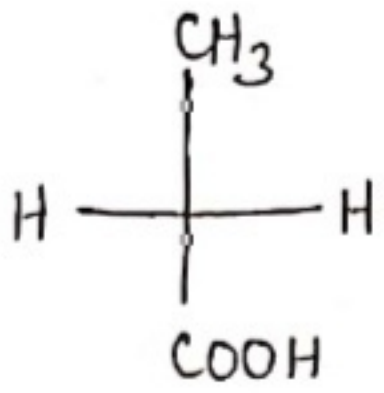
Cannot exist in two non-superimposable forms. eg; caabd

eg,



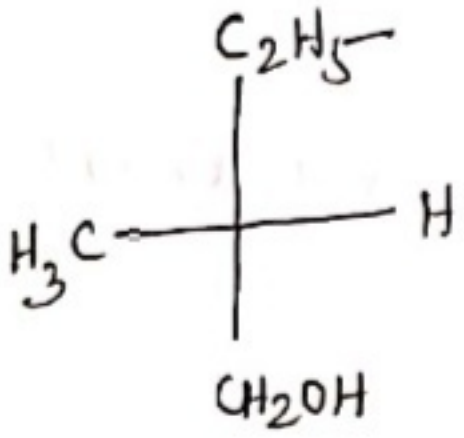
Lactic acid

(Chiral, Optically active)



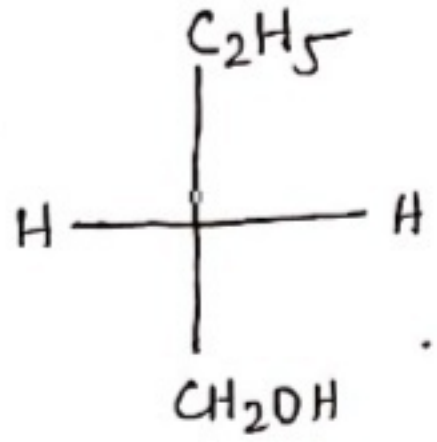
Propanoic acid

(AChiral, Optically inactive)



2-methylbutan-1-ol

(Chiral, Optically active)



n-Butanol

(Achiral, Optically inactive)

* The presence of Chiral carbon in a compound is probably essential for asymmetry and hence enantiomerism.

However, in practice, it is found that a few molecules although contain chiral carbon atom yet these are not chiral and hence donot show optical activity (eg, meso tartaric acid).

* In general,

No. of optical isomer (enantiomer) $= 2^n$

Where n = No. of chiral carbon.

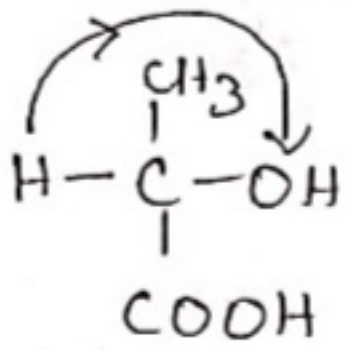
If $n=1$, No. of optically active forms $= 2^1 = 2$

the two enantiomers have the same physical and chemical properties, but they differ only in their action on plane polarised light.

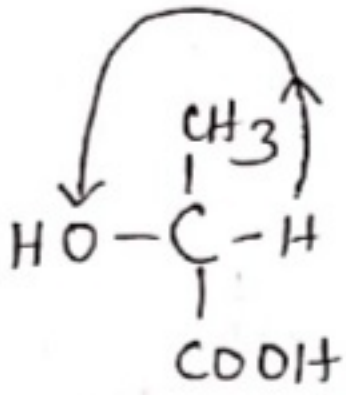
* If two enantiomers are mixed in equimolecular quantities, the resulting product becomes optically inactive due to the external compensation of the two constituents.

* Such type of optically inactive compounds is known as racemic modification.

ex :- Lactic acid



d- or (+)- Lactic acid



l- or (-) Lactic acid

These two forms are non- superimposable mirror image of each other.

To be continued in next lecture...