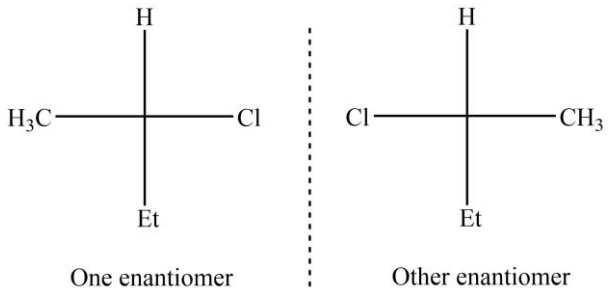
❖ Methods of Resolution

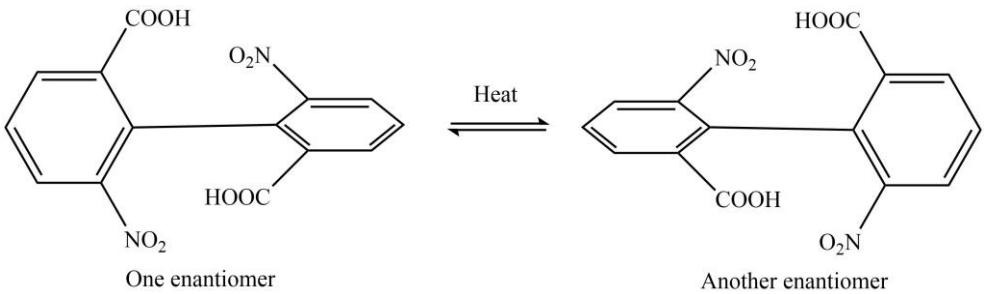
If the amount of laevorotatory and dextrorotatory enantiomers of a chiral molecule are equal in a solution, it will be called as a racemic mixture or racemate. One of the first racemic mixtures known was racemic acid, which is a mixture of the two enantiomeric forms of tartaric acid. A solution with only one enantiomer is called an enantiomerically pure or simply the enantiopure compound.



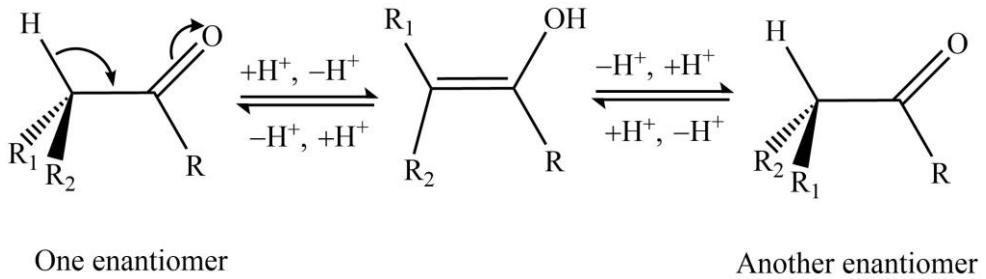
➢ *The Phenomenon of Racemization*

The phenomenon of racemization in most of the organic compounds can take place via the mechanisms given below.

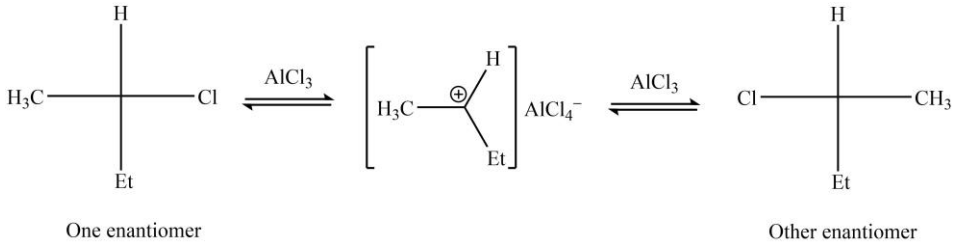
1. By the rotation about carbon-carbon single bond: When an enantiomer of optically active biphenyl derivative is heated, some of it can easily be converted into another enantiomer just by the rotation about carbon-carbon single bond.



2. By the phenomenon of enolization: When an enantiomer of optically active biphenyl derivative is heated, some of it can easily convert into another enantiomer just by the rotation about carbon-carbon single bond.

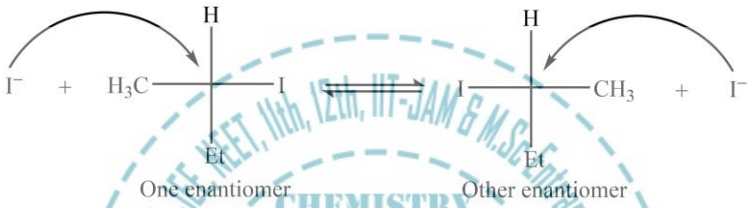


3. By SN_1 mechanism: The racemic mixture can also be obtained by subjecting an enantiomer in a typical SN_1 attack with the same nucleophile.



One enantiomer Other enantiomer

4. By SN_2 mechanism: The racemic mixture can also be obtained by subjecting an enantiomer in a typical SN_2 attack with the same nucleophile.



One enantiomer Other enantiomer

➢ ***The Resolution of Racemic Mixture***

The process of getting individual enantiomers from a typical racemic mixture by any physical or chemical route is called as the resolution of racemic mixtures. Some methods of resolution are given below.

1. Mechanical separation: This is the most popular and easy method to resolve an enantiomeric mixture into it components. This method involves the hand-picking of single crystals of R and S enantiomers using tweezers and a magnifying glass.

2. Chemical method: We know that enantiomers have the same physical properties but different chemical properties towards chiral reagents and differences in physical properties must be used for the act of separation. Therefore, is very much favorable to convert the enantiomers into corresponding diastereomers, which in turn, can be converted into corresponding enantiomers by using the difference between the physical properties.

3. Biochemical extraction: It is quite a well-known fact that many enantiomers are quite consumable by certain types of bacteria; and therefore, only one enantiomer of the racemic mixture will be left behind if the same is subjected to such conditions. For instance, penicillium glaucum eats (+)-tartaric acid leaving behind (+)-tartaric acid only. Now although the method is quite easy to follow, it suffers from the drawback of the destruction of almost half of the compound.

4. Chromatographic separation: The individual enantiomers of a racemic mixture can also be separated by employing the route of "column chromatography' when the adsorbent-taken is an optically active compound. Now since only one enantiomer will get attached strongly to the adsorbent, the elution of the column will result in the earlier extraction of weakly bound enantiomer.

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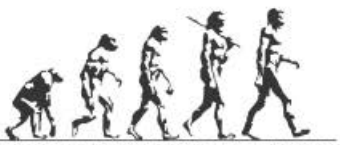

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