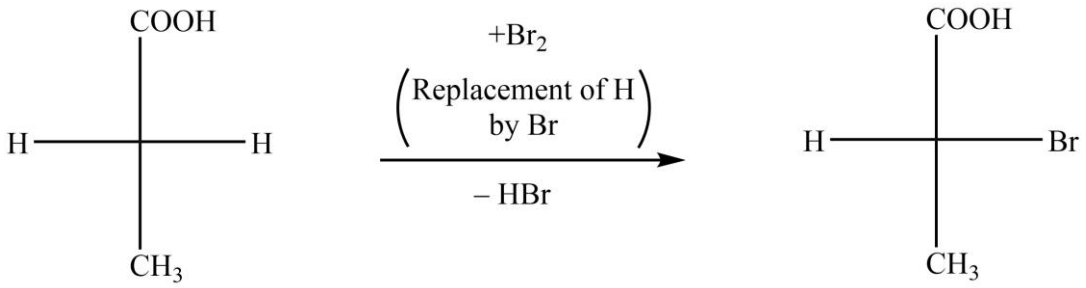
❖ Prochirality

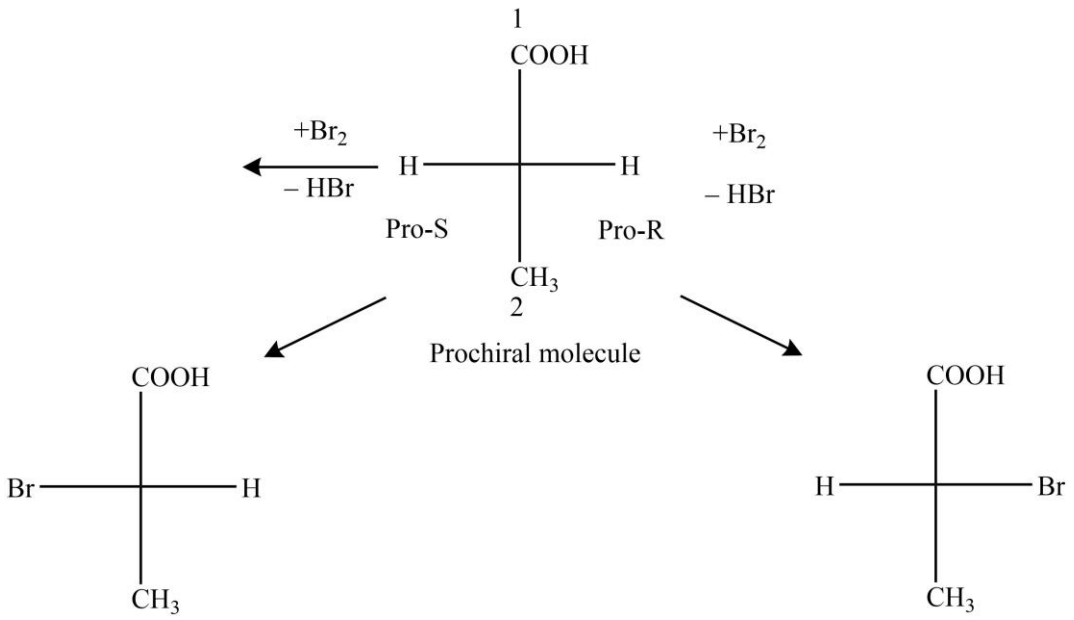
The prochirality in stereochemistry may simply be defined as the property of a molecule by which can be converted from achiral to a chiral entity in a single step, and such molecules are called as prochiral molecules.

This can be understood by taking the example of propanoic acid where two identical substituents are attached to an sp^3-hybridized carbon atom, and the pro-R and pro-S descriptors are used to differentiate between the two.



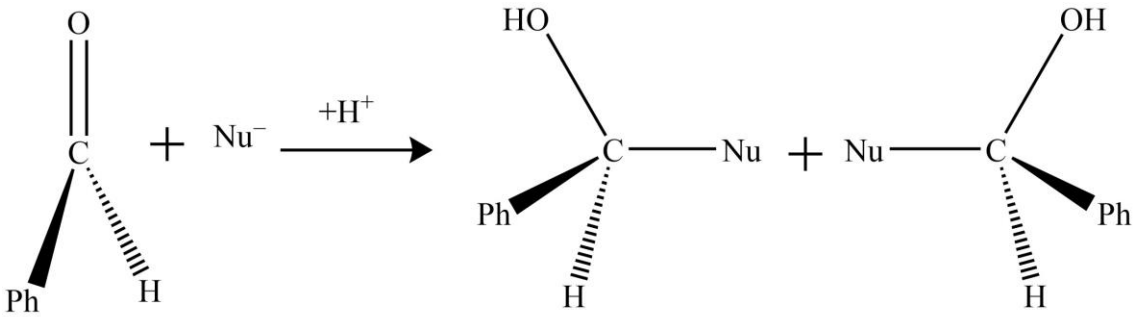
Prochiral molecule Chiral molecule

In other words, if we promote the pro-R substituent to a higher priority than the other identical substituent, we will get an R chirality center at the sp^3-hybridized carbon, and vice-versa is also true.



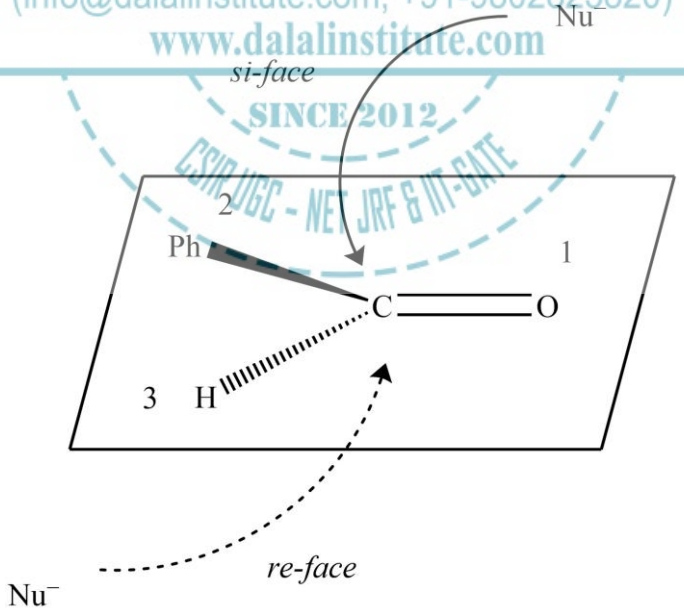
S-enantiomer R-enantiomer

An sp^2-hybridized carbon atom with trigonal planar coordination can also be converted to a chiral center if a group is attached to the '*re*' or '*si*' face of the organic molecule under consideration. For instance, imagine the case of benzaldehyde where the attack from the front and rear sides results in an enantiomeric pair.



Enantiomeric Pair

The face will be labeled '*re*' if the substituents priority decreases in clockwise order at the trigonal atom when looking at that face; the face will be labeled '*si*' if the substituents priority decreases in anticlockwise order at the trigonal atom when looking at that face. Also, the designation of the resulting optically active carbon as S or R is a function of the priority of the incoming substituent.



Furthermore, if an achiral species can be converted to a chiral one in two steps, it will be called a proprochiral. converted to a chiral one in two steps, it will be called a proprochiral.

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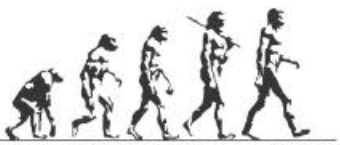

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