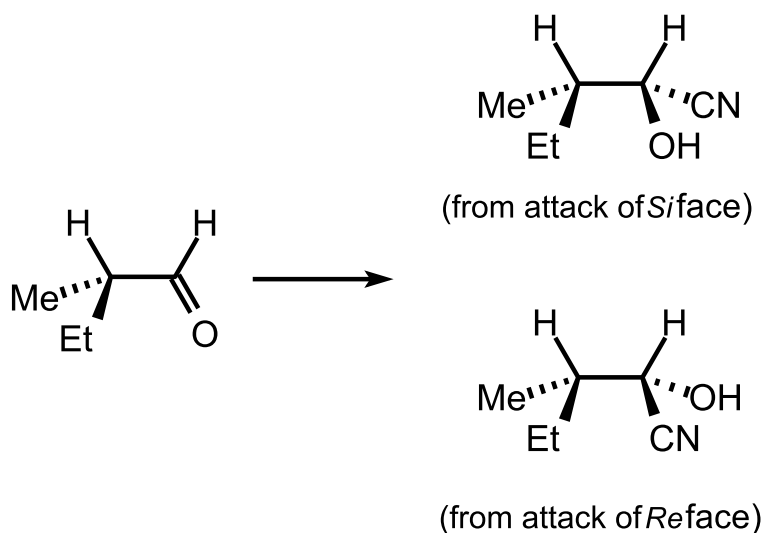


prochirality

Also contains definition of: prochirality

This term is used in different, sometimes contradictory ways; four are listed below.

1. The geometric property of an achiral object (or spatial arrangement of points or atoms) which is capable of becoming chiral in a single desymmetrization step. An achiral molecular entity, or a part of it considered on its own, is thus called prochiral if it can be made chiral by the replacement of an existing atom (or achiral group) by a different one. An achiral object which is capable of becoming chiral in two desymmetrization steps is sometimes described as prochiral. For example the prochiral $\text{CH}_3\text{CO}_2\text{H}$ becomes prochiral as $\text{CH}_2\text{DCO}_2\text{H}$ and chiral as CHDTCO_2H .
2. The term prochirality also applies to an achiral molecule or entity which contains a trigonal system and which can be made chiral by the addition to the trigonal system of a new atom or achiral group. For example addition of hydrogen to one of the enantiotopic faces of the prochiral ketone $\text{CH}_3\text{CH}_2\text{COCH}_3$ gives one of the enantiomers of the chiral alcohol $\text{CH}_3\text{CH}_2\text{CHOHCH}_3$; the addition of CN^- to one of the diastereotopic faces of the chiral aldehyde shown below converts it into one of the diastereoisomers of the cyanohydrin. The two faces of the trigonal system may be described as *Re* and *Si*.



3. The term prochiral also applies to a tetrahedral atom of an achiral or chiral molecule which is bonded to two stereoheterotopic groups. For example, the prochiral molecule $\text{CH}_3\text{CH}_2\text{OH}$ can be converted into the chiral molecule CH_3CHDOH by the isotopic replacement of one of the two enantiotopic hydrogen atoms of the methylene group. The carbon atom of the methylene group is called prochiral. The prochiral molecule $\text{HO}_2\text{CCH}_2\text{CHOHCH}_2\text{CO}_2\text{H}$ can be converted

groups. The carbon atom of the CHOH group is called prochiral. The chiral molecule $\text{CH}_3\text{CHOHCH}_2\text{CH}_3$ can be converted into one of the diastereoisomers of $\text{CH}_3\text{CHOHCHDCH}_3$ by the isotopic replacement of one of the two diastereotopic hydrogen atoms of the methylene group. The carbon atom of the methylene group is called prochiral. The stereoheterotopic groups in these cases may be described as *pro-R* or *pro-S*. Reference to the two stereoheterotopic groups themselves as prochiral, although common, is strongly discouraged.

See: chirality centre

4. The term prochirality is also applied to the enantiotopic faces of a trigonal system.

Source:

PAC, 1996, 68, 2193 (*Basic terminology of stereochemistry (IUPAC Recommendations 1996)*) on page 2213