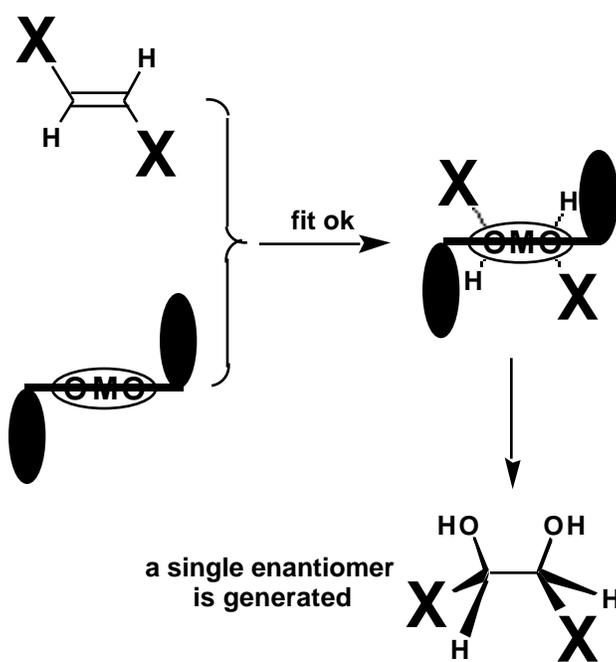
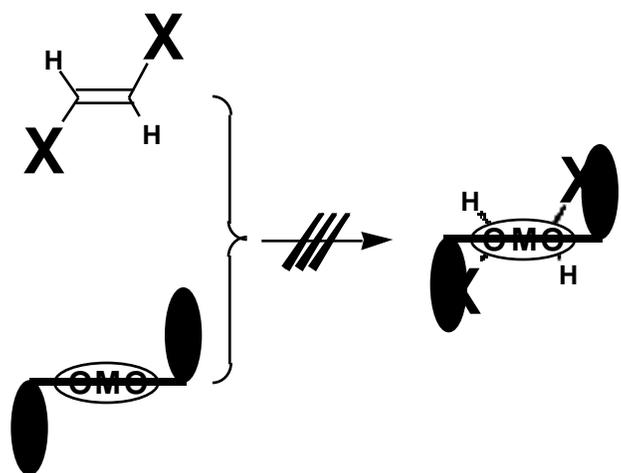


Text Related to Segment 12.06 ©2002 Claude E. Wintner

In the previous segment we have seen that an achiral reagent will differentiate between Re, Si versus Re, Re (or Si, Si) faces, a diastereomorphous difference, affording thereby different (diastereoisomeric) products. On the other hand, the Re, Re versus Si, Si stereochemical difference is an *enantiomorphous* one, and as such requires a chiral reagent to recognize it. Thus, for *cis* hydroxyl addition to *E*-2-butene, racemic 2,3-butanediol is formed, a result of the inability of the (achiral) osmium tetroxide reagent to differentiate between the faces, hence leading to the enantiomeric pair.

However, we already have seen that an enzyme (chiral) is capable of differentiating between the enantiomorphous faces of acetaldehyde, just as a right (or left) hand is capable of differentiating between a right hand or a left hand, by transforming the enantiomorphous difference into a diastereomorphous one. In the same manner, if in the course of *cis* hydroxyl addition to *E*-2-butene a chemical differentiation can be made between the enantiomorphous faces of the alkene, then an *enantioselective* reaction will have been carried out. In fact, such stereoselection can be achieved under appropriate reaction conditions, which must involve a *chiral* controlling reagent. In the schematic example below, a metal M, mediated by such a chiral controller, is favored to present oxygen to just one of the enantiomorphous faces of a symmetrical *E*-olefin, the outcome being *cis* addition of hydroxyl groups to give a single enantiomer. This result is possible because the differentiation between the enantiomorphous faces of the alkene by the *chiral* reagent is a *diastereomorphous* selection, comparable to the differentiation between a pair of right hands and a pair of left hands that a right hand (or a left hand) can make.



principle of enantioselective reaction