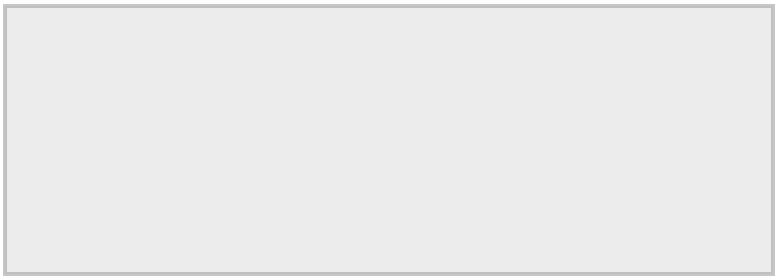
12.15: Sharpless Epoxidation

Epoxides are very useful intermediates in organic synthesis. Because most naturally occurring molecules (including those with medicinal properties) are chiral, control of stereochemistry is one of the most important challenges facing a synthetic chemist attempting to synthesize a naturally occurring molecule in the laboratory. In what was arguably one of the most important discoveries in synthetic organic chemistry in recent decades, Barry Sharpless of Stanford University reported in 1980 that he and his colleagues had developed a method to stereoselectively epoxidize asymmetric alkenes which contained an alcohol in the allylic position. The '**Sharpless asymmetric oxidation**' is achieved with the use of a chiral catalyst composed of (+) or (-) diethyltartrate and an organotitanium compound (*J. Am. Chem. Soc*. **1980**, *102*, 5974). Depending on which stereoisomer of diethyltartrate is used, the peroxyacid oxygen tends to add to either the top or bottom plane of the alkene.



This technique allows for the specific introduction of two new stereocenters at an alkene position, which as you can imagine makes it an extremely useful synthetic tool.

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