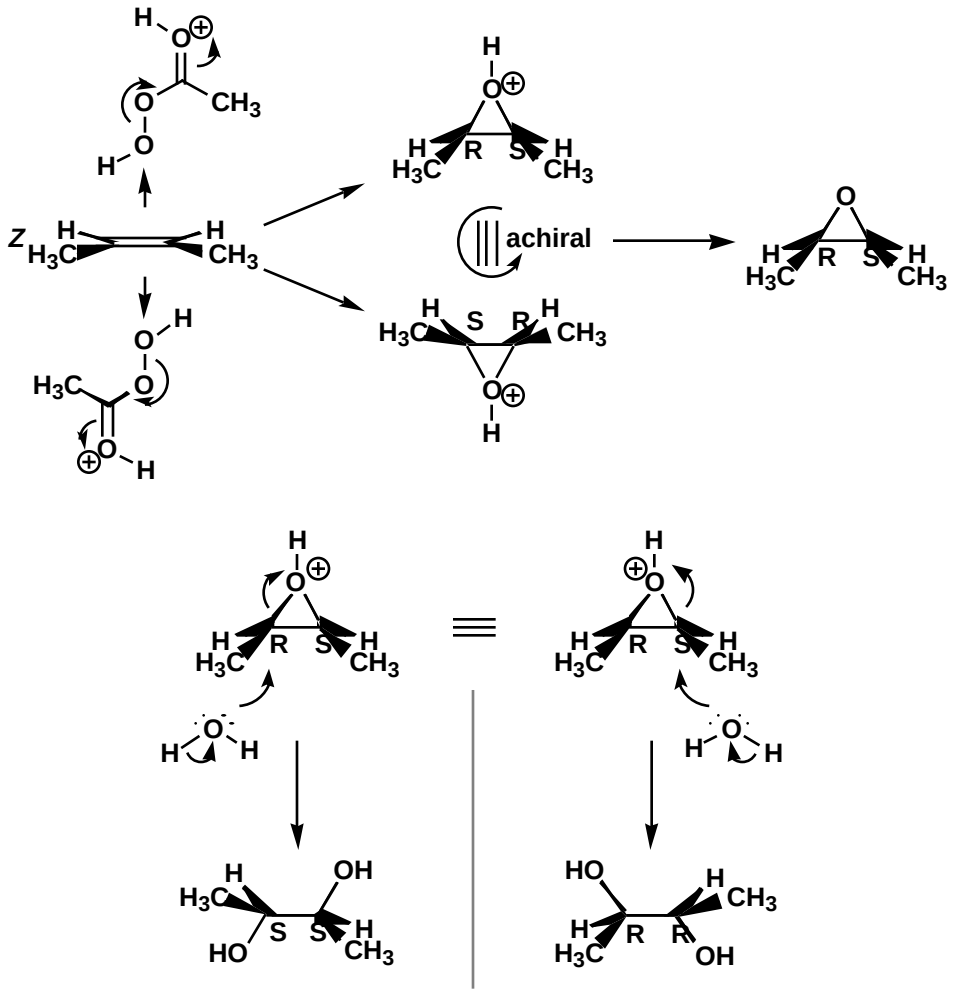
Text Related to Segment 15.03 ©2002 Claude E. Wintner

The electrophilic addition reaction of peracids to alkenes to yield oxiranes (epoxides; Segment 12.03) already has been mentioned. Subsequent acid-catalyzed hydrolysis of the oxiranes, with water performing S_N2 backside displacement of the protonated C—O bond of the strained oxirane ring, produces an overall stereochemical outcome — *trans* addition of *hydroxyl* groups — exactly opposite to the *cis* addition observed with osmium tetroxide and related reagents (Segment 12.04). From *Z*-2-butene a single achiral oxirane product results, because the two faces of the olefin are homomorphous. This then is hydrolyzed at its enantiotopic carbon centers to give chiral (R,R and S,S) 2,3-butanediol:



***Z*-2-butene and peracids yield only an achiral oxirane and, in consequence, only chiral (R,R and S,S) 2,3-butanediol, as a racemic mixture**