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2.6.2 Reactions Catalyzed by Halohydrin Dehalogenases

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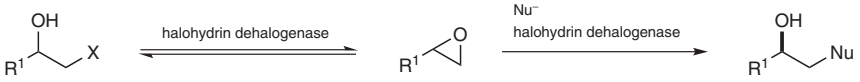
In some bacteria, halohydrin dehalogenases catalyze the conversion of vicinal halo alcohols, such as 1,3-dichloropropane or 3-chloropropane-1,2-diol, into epoxides, and thereby play a role in the biodegradation of halogenated organic compounds. In the reverse reaction, i.e. epoxide ring opening, various small anions can replace the halide, allowing the synthesis of β-substituted alcohols, including β-hydroxynitriles and β-azido alcohols. These remarkable catalytic properties have been modified by structure-based protein engineering, making the enzymes suitable for diverse applications.



Keywords: epoxides · hydroxynitriles · microorganisms · alcohols · cyanides

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2.6.3 Expoxide Hydrolysis

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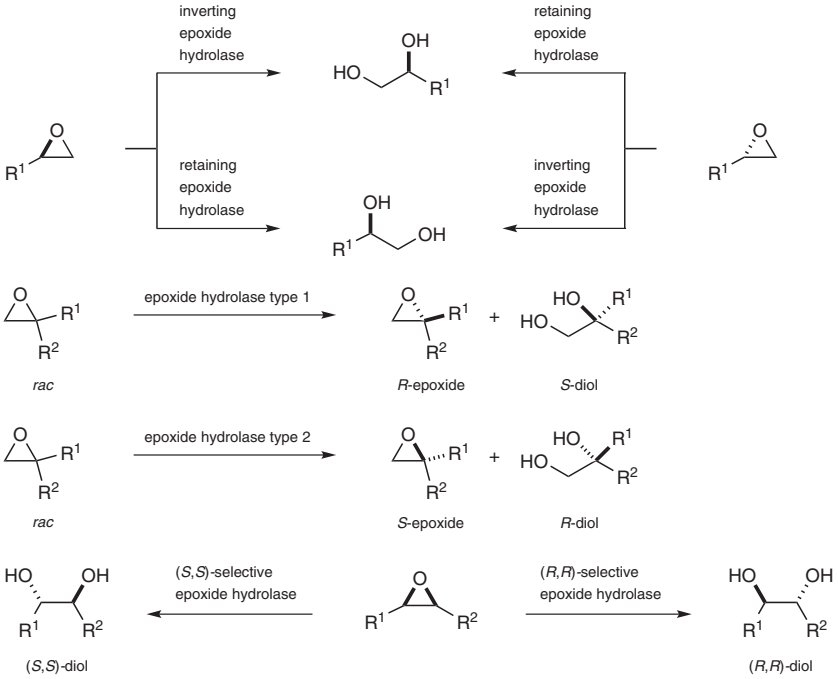
This chapter focuses on the selective biocatalytic ring opening of epoxides by water, leading to vicinal diols or other reaction products. This strategy is also used by nature to prepare a range of important metabolites and natural products by epoxide hydrolase catalyzed ring-opening reactions. The hydrolysis of easily accessible racemic epoxides to enantiomerically pure epoxides or vicinal diols has become of increasing interest as a method for preparing a great variety of chiral intermediates for the synthesis of pharmacologically active compounds, agrochemicals, flavors and fragrances, and metabolites.



Keywords: epoxy compounds · oxiranes · epoxide hydrolase · diols · hydrolysis · resolution · ring opening