

# Multifaceted Strategies for Regioselective Functionalization of Unsymmetrical Diols

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## Abstract

Polyols, distinguished by their multiple hydroxyl groups, are widespread in both natural and synthetic compounds, serving as essential intermediates in pharmaceuticals, agrochemicals, and materials research. Among this broader category, diols stand out as both an essential subset of polyols and a model system for developing selective functionalization strategies. Although diols contain fewer hydroxyl groups than higher-order polyols, the challenge of distinguishing between two nearly identical hydroxyl groups remains a fundamental hurdle. This presentation explores selective catalytic systems that leverage non-covalent interactions (NCIs), particularly hydrogen bonding,  $\pi$ - $\pi$  stacking, and ion-pair to achieve precise functionalization of diols. By strategically harnessing these interactions, these approaches address inherent selectivity challenges, enabling selective protection, glycosylation, and deoxygenation of diol substrates. The resulting transformations yield valuable products, including sugar building blocks, novel antibiotic derivatives, and *vicinal*-functionalized alcohols, expanding the synthetic potential of diols in complex molecular frameworks.

### Non-Covalent Interaction (NCI)-Promoted Regioselective Functionalization of Diols

