SIGMA-ALDRICH LECTURE IN SYNTHESIS

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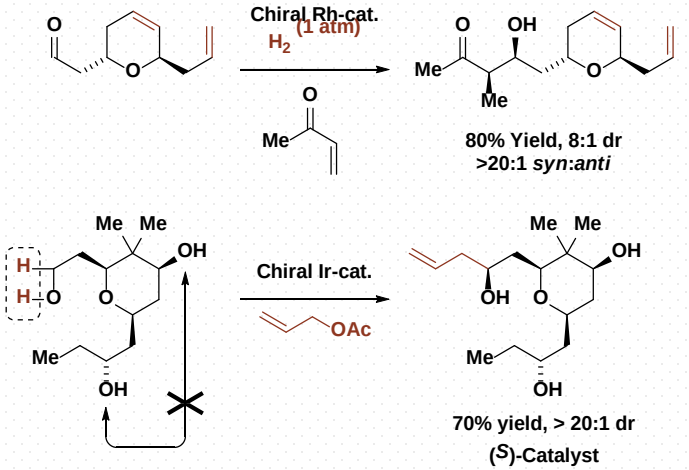
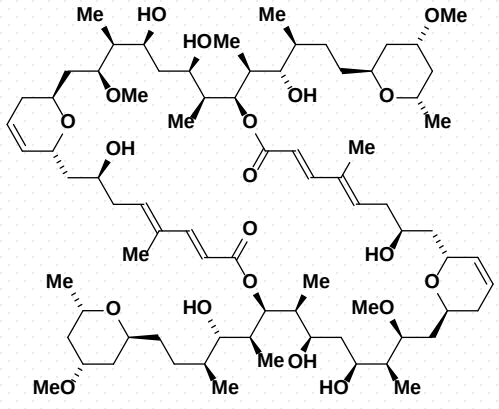
Hydrogen-Mediated C-C Bond Formation

Stereo- and site-selective methods for the byproduct-free modification of unprotected organic compounds that occur through the addition or redistribution of hydrogen are natural endpoints in the advancement of methods for efficient, green chemical synthesis. Progress toward this goal requires a departure from reactants that embody non-native structural elements, including stoichiometric organometallic reagents, directing/protecting groups and chiral auxiliaries. **Professor Michael J. Krische** (B.S. UC Berkeley; PhD Stanford University) has developed a broad, new family of C-C bond formations that merge the characteristics of catalytic hydrogenation and carbonyl addition. Hydrogenation or transfer hydrogenation of π-unsaturated reactants in the presence of C=X (X = O, NR) bonds delivers products of carbonyl or imine addition. In related hydrogen auto-transfer reactions, alcohols served dually as reductants and carbonyl proelectrophiles, enabling direct conversion of lower alcohols to higher alcohols. Such hydrogen-mediated C-C bond formations define a departure from the use of stoichiometric organometallic reagents and the issues of safety, selectivity, and waste associated with their use.





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