

Seminar

9:45 a.m. Thursday, March 8 • 331 Smith Hall



Clark Landis

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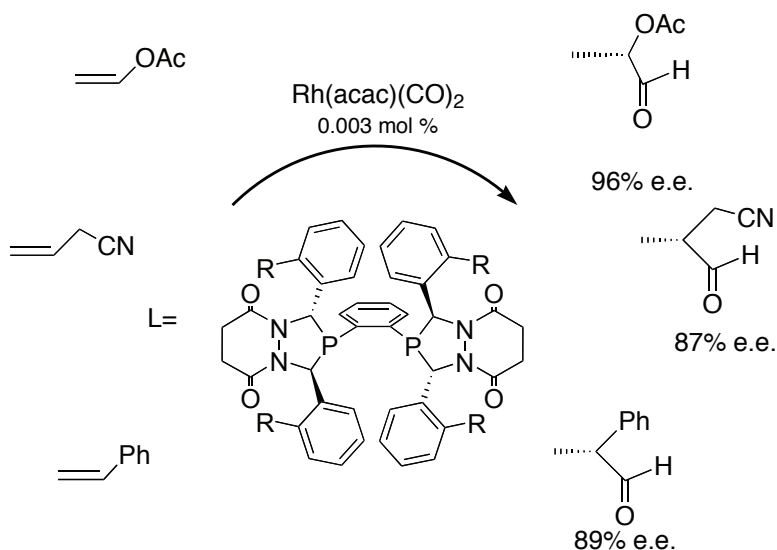
Enantioselective Hydroformylation: Complex Molecules and Complex Mechanism

Research interests center on catalysis and include mechanisms of metal-catalyzed alkene polymerization and enantioselective hydroformylation, development of new NMR and mass spectrometric methods for measurement of rapid kinetics, synthesis and applications of modular chiral diazaphospholane ligands, computational modeling of catalytic processes, bonding theory, and chemical education.

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Abstract

Critical attributes of green chemical processes include high atom economy, catalytic use of expensive reagents, selectivity, building complexity from simplicity, and simple separations. Enantioselective hydroformylation—by which enantiopure transition metal complexes selectively catalyze the conversion of simple alkenes, dihydrogen, and carbon monoxide into chiral aldehydes—possesses many of these attributes. Our construction of practical catalysts for enantioselective hydroformylation incorporates computer modeling, development of new organophosphorous chemistry, and strategies for making diverse collections in order to produce a new class of ligand, 3,4-diazaphospholanes. Catalysts based on rhodium complexes of 3,4-diazaphospholanes are highly active and selective for the hydroformylation of simple alkenes such as allyl ethers, vinyl acetates, vinyl enamides, aryl alkenes, and 1,3 dienes. The resulting products constitute powerful chiral building blocks, especially for the pharmaceutical industry. The robustness of hydroformylation catalysts enables tandem processes in which complex molecules can be made in “one-pot”. What is the origin of selectivity in the multistep catalytic cycle of hydroformylation? Insights arise from careful studies of gas pressure effects on rate and selectivity, the application of isotopic labels, and reaction kinetics.



Host: Professor Christopher Cramer
Refreshments will be served prior to the seminar.