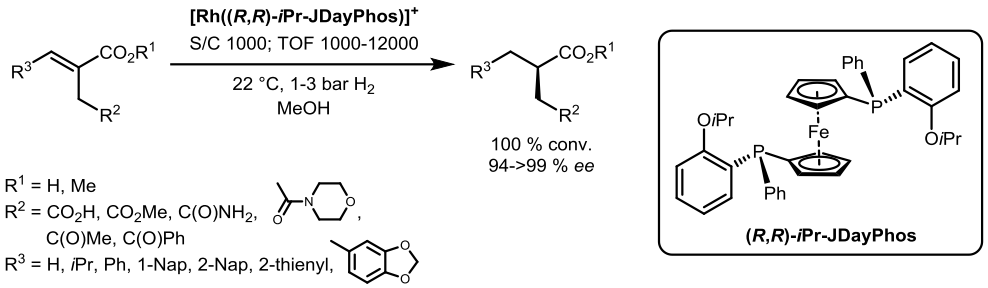
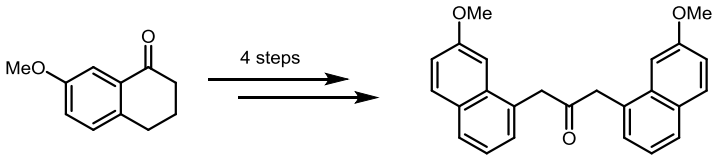
Asymmetric hydrogenation catalyzed by transition metal-chiral organic ligand complexes is one of the best methods for the preparation of stereomerically pure organic compounds. Despite the existence of a plethora of efficient chiral ligands there is still a demand for the development of new ones due to the specific needs of industries and the structural diversity of prochiral substrates to be transformed.

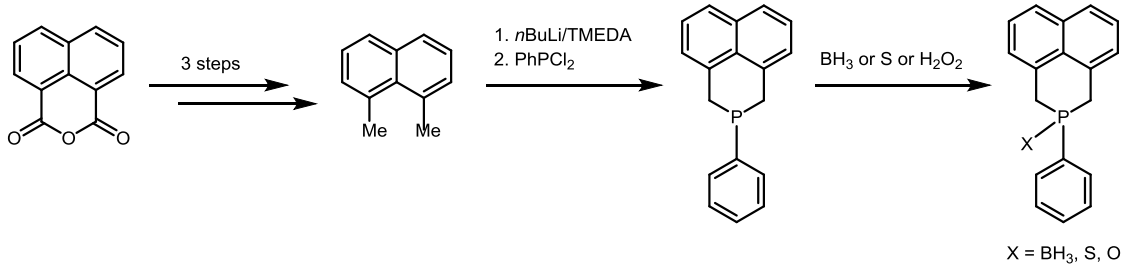
In this work we examined the utility of a previously-prepared *P*-stereogenic ferrocene ligand dubbed (*R*,*R*)-*i*Pr-JDayPhos in Rh-catalyzed asymmetric hydrogenation of some model prochiral substrates. Moderate to high activities and exceptional enantioselectivities were obtained in the asymmetric hydrogenation of various β-unsubstituted or β-substituted itaconates and α-methylene-γ-oxo-carboxylates. The quantitative and highly enantioselective reduction of 1-methyl-(*E*)-2-(1-naphthylmethylene)succinate (R^1 = Me, R^2 = CO_2H, R^3 = 1-Nap; *ee* >99 %) in 4 hours using a mere 0.01 mol % of the catalyst proves its synthetic usefulness.



This work includes an attempt to synthesize a novel spiro acenaphthene-type diphosphine ligand. We managed to prepare 1,3-bis(7-methoxynaphthalen-1-yl)propan-2-one but its cyclization to a spiro compound failed.



We also synthesized new compounds of the 1,8-(2-phenylphospha-1,3-propanediyl)naphthalene type. Such cyclic phosphine unit can be potentially used for the synthesis of new structures of chiral mono- and diphosphine ligands with increased sterics.



Key words: asymmetric hydrogenation, phosphine ligands, rhodium