UNIVERSITAT ROVIRA I VIRGILI
SCREENING OF MODULAR CARBOHYDRATE LIGAND LIBRARIES
IN ASYMMETRIC METAL-CATALYZED C-C AND C-X BOND FORMATION REACTIONS
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ISBN:978-84-691-0375-3/DL:T.2193-2007

2. Objectives

The objective of this thesis is to develop new chiral ligands derived from carbohydrates for application as chiral auxiliaries in several important asymmetric catalytic reactions.

The more specific aims are:

1. To design and synthesize new highly modular phosphite-oxazoline (**L1**-**L5**), phosphite-phosphoroamidite (**L6**) and monophosphite (**L7**-**L11**) ligand libraries (Figure 1).

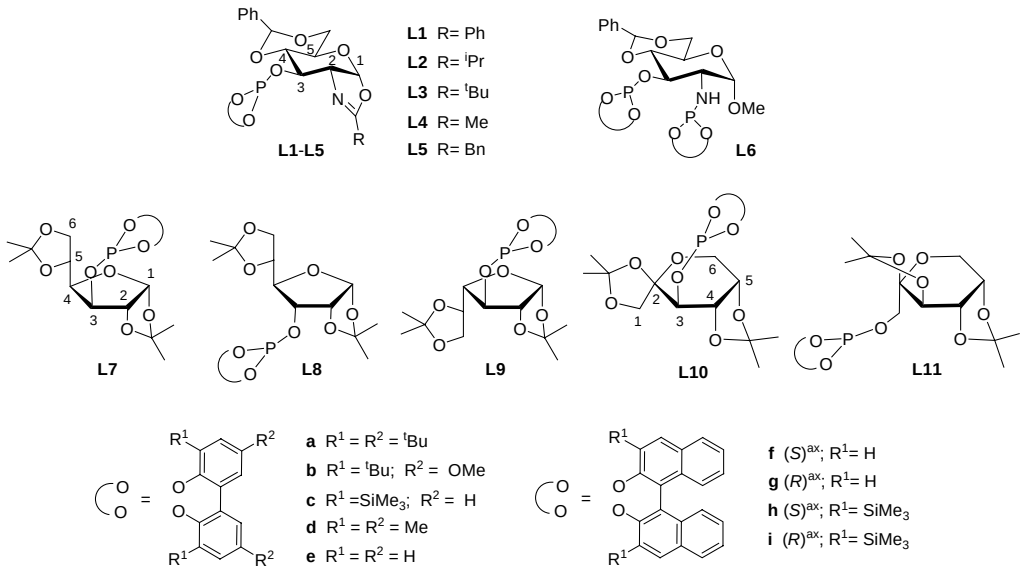

Figure 1. Phosphite-oxazoline (**L1**-**L5**), phosphite-phosphoroamidite (**L6**) and monophosphite (**L7**-**L11**) ligand libraries synthesized in this thesis.

These libraries are systematically designed to ensure a maximum diversity regarding electronic and steric properties of the ligand parameters that will ensure a wide scope in the asymmetric processes studied in this thesis. Therefore, the

phosphite-oxazoline ligand library is derived from inexpensive D-glucosamine and contains substituents with different electronic and steric proprieties in the ozaxoline moiety (**L1-L5**) and several substituents/configurations in the birayl phosphite moieties (**a-i**), whose effect on the catalytic performance will be studied. The second library (**L6**) is related to the first one but has a phosphoroamidite group instead of a oxazoline moiety. This apparently simple modification produces important changes in the structural and electronic properties of the ligands, which are know to play a crucial role on the catalytic performance. Finally, the monophosphite ligand library is derived from D-glucose, D-galactose and D-fructose, which lead to a wide range of sugar backbones (**L7-L11**), and contain several substituents/configurations in the biaryl moiety (**a-i**).

2. To apply these ligand libraries in the Pd-catalyzed asymmetric allylic substitution, Pd-catalyzed asymmetric Heck reactions, Ni-catalyzed asymmetric addition of trialkylaluminium to aldehydes and Cu-catalyzed 1,4-conjugate addition of trialkylaluminium reagents to enones.