ORGANOMETALLIC COMPLEXES BEARING SALMEN AND SALBEN LIGANDS AND THEIR APPLICATION IN CATALYSIS

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Abstract

H_2salmen and H_2salben (**Figure 1**) are Schiff bases formed by the condensation of salicylaldehyde (salH) with methylenediamine (men) and phenylenediamine (ben), respectively. These ligands are structurally related to the well-known H_2salen (employing ethylenediamine, en) and exhibit similar N_2O_2 coordination environment toward metal ions. However, due to the one-carbon chain between the iminic nitrogen atoms, H_2salmen and H_2salben tend to form dinuclear [1,2] or oligonuclear [3] metal complexes. These complexes typically adopt geometries that lie between square planar and tetrahedral [1,2], in contrast to the mononuclear square planar complexes, characteristic of H_2salen [4]. Copper [1], cobalt [2,3], iron [5,6], and manganese [5] readily form complexes with these ligands. The flexibility of the coordination environment and the stabilization of mixed oxidation state species play a crucial role in the development of efficient catalyst.

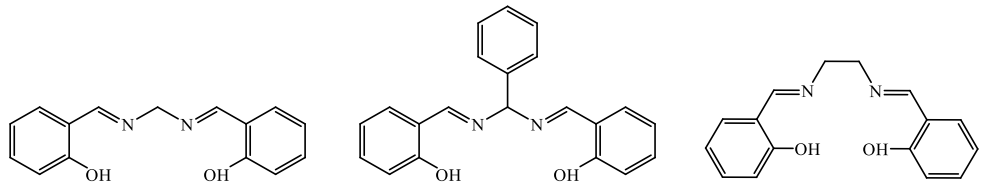

***Figure 1**: structure of H_2salmen, H_2salben and H_2salen ligands*

Building on the successful application of copper(II)-salmen and salben complexes in C-N coupling reactions [7] as well as the established catalytic activity of metal-salen complexes [4], my PhD project aims to expand the understanding of metal-salmen/salben derivatives through a three-steps approach. First, efforts will focus on the synthesis of tuned salmen and salben ligands, building upon the expertise developed in our research group, followed by complexation with first-raw metal ions, particularly cobalt [2]. Next, the catalytic properties of the new obtained complexes will be evaluated in selected benchmark, focusing on the performances in coupling reaction, including C-C, C-O and C-N bond formation. Finally, mechanistic investigation will be carried out to gain deeper insight into the catalytic pathways, enabling the rational design of next-generation metal complexes.

References

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