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

Lorenzo Marchi,[a] **Serena Maria Fantasia**,[b] **Marina Cocchi** [a] **& Luca Rigamonti** [a]
[a] Dipartimento di Scienze Chimiche e Geologiche, Università degli Studi di Modena e Reggio Emilia, via G. Campi 103, 41125 Modena, Italy
[b] Department of Synthetic Molecules Technical Development, Process Chemistry & Catalysis, F. Hoffmann-La Roche Ltd, Basel, Switzerland
Contacts: lorenzo.marchi@unimore.it, luca.rigamonti@unimore.it

ABSTRACT

H_2salmen (*N,N′*-bis(salicylidene)methanediamine) and H_2salben (*N,N′*-bis(salicylidene)phenyl-methanediamine) (**Figure 1**) are Schiff bases obtained from condensation between salicylaldehydes (salH) and methanediamine or phenylmethanediamine, and can be used as N_2O_2 tetradentate ligands towards the complexation of metal ions like copper [1], cobalt [2,3], iron and manganese [4].

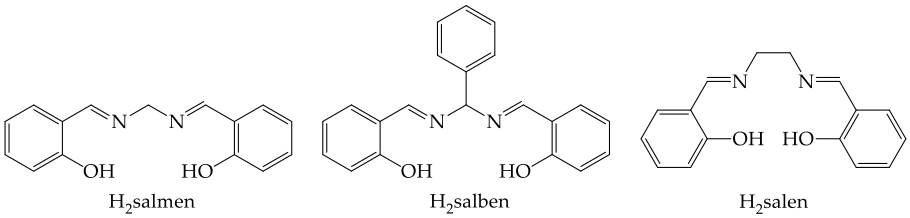

Figure 1. Molecular structure of H_2salmen, H_2salben and H_2salen.

Differently from the most famous tetradentate Schiff base H_2salen (**Figure 1**), derived from salH and ethylenediamine (en), which possesses the same tetradentate N_2O_2 donor atom set, H_2salmen and H_2salben have one carbon atom bridging the two imine groups. This is crucial in the formation of di- or polynuclear metal complexes [1-4], and in the case of copper(II) [1] and cobalt(II) [2], the metal ion coordination is between tetrahedral and square planar (the latter, typical for mononuclear salen complexes). Those properties can be exploited for obtaining efficient catalysts, thanks to the flexibility of the coordination environment and the possibility to obtain mixed oxidation state species [2]. My PhD project will be then devoted to the study of metal-salmen/salben complexes for potential application in catalysis, in analogy to the well-known catalytic properties of metal-salen derivatives [5]. First, efforts will be directed toward the synthesis of H_2salmen and H_2salben ligands with modulated steric and electronic features with the help of chemometrics methods, followed by the coordination of first row transition metals. The catalytic properties of the new complexes will be tested on benchmark or redox reactions as documented for salen-M complexes (M = Co, Cu, Fe, Mn). Chemometrics tools will be a valid support also at this stage to rationalize the findings and model the catalytic activities of the systems. The reaction mechanisms of the tested catalysts will be also explored to help improving the efficiency upon modulation of the reaction conditions.

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