



## Polymerization of Salen Schiff Base Reaction and Catalytic Transformations

Anacona Kadhim\*

Department of Chemistry, University of de Oriente, Cumana, Venezuela

### DESCRIPTION

The Schiff bases are classical ligands for the metal ions like p, d, and f blocks, which have significantly contributed to the development of co-ordination chemistry on both basic and applicative aspects, with a special reference to catalysis. The Schiff's base reaction is a group-specific reaction for the aldehydes. This reaction usually occurs under basic conditions with aromatic amines to form a Schiff's base. Aniline is normally used to form a colored Schiff's base with an aldehyde.

These ligands are considered as "Privileged Ligands" because they are easily prepared by condensation between aldehydes and imines. They are able to co-ordinate many different metals, and stabilize them in various oxidation states, enabling the use of Schiff base metal the complexes for large variety of useful catalytic transformations.

Many complexes of metal ions show high catalytic activity. The Chiral Schiff base complexes are more selective in various reactions such as oxidation, hydroxylation, aldol condensation and epoxidation. The catalytic activity of metal complexes of bi-naphthyl, bi-naphthol and their combinations with "Salen Schiff Base" is presented. As pyridyl bis(imide) and pyridine bis(imine) complexes of cobalt(II), iron(II) ions have been used as catalysts in the polymerization of ethylene and propylene. The phenoxy-imine (FI) complexes of zirconium, titanium and vanadium and the Schiff base complexes of nickel(II) and palladium(II) were also used as catalysts in the polymerization of ethylene. The complexes of these metal ions were catalytic ring opening for the polymerization processes at low temperature.

Schiff base complexes also catalyzed the oxidation of sulfides, thio-anisoles, aldehydes, phenol and styrene. These complexes are in super critical carbon dioxide (ScCO<sub>2</sub>) and in the presence of polar solvents were active catalysts. They show significant activity in catalyzing allylic alkylations, hydrosilation, the decomposition of hydrogen peroxide, isomerization, and annulation and carbonylation reactions.

They stabilize at different metal ions in a solution to yield metal complexes with a wide variety of properties and applications. For

instance, one of these ligands, like the chelating salen, is known by the ability for significant decrease in the Mn(III)/Mn(II) redox potentials, and resulting complexes of constitute suitable systems in order to catalyze the multiple redox reactions such as asymmetric epoxidation of unfunctionalized olefins, catalase reaction, water photolysis, Diels-Alder cycloaddition, enantioselective cyclopropanation of styrenes and ring opening of epoxides. Over past years, the applications of this complex have been reported, including a broad range of biological activities (antibacterial, antifungal, anticancer, antioxidant, anti-inflammatory, etc.,).

The structures of these new compounds (ligand and its complexes) were characterized by UV-Vis, FTIR, LC-MS, <sup>1</sup>H NMR, <sup>13</sup>C NMR, magnetic susceptibility, conductivity measurement, X-ray powder diffraction method, and thermal analyses techniques. The <sup>1</sup>H-NMR chemical shifts of all complexes were calculated by using the gauge-invariant atomic orbital HF method in DMSO phases. All measured results have been compared with the experimental data.

The new metal catalysts which contain salen-type ligands have been observed for a better catalytic behavior when the substrate molecule is easily co-ordinated by the complex and favored when the catalyst has either a vacancy in the coordination sphere or a labile ligand. H<sub>2</sub>L<sub>1</sub>-H<sub>2</sub>L<sub>2</sub> have been obtained from quantitative yield and characterized by the elemental analysis, IR, <sup>1</sup>H, and <sup>13</sup>C-NMR spectroscopies, and also Mass Spectrometry Electrospray (MSE). The correlation of peroxidase activity and rhombicity that caused by the short length of the Schiff base should be taken into account for designing the new potential catalytic systems. The two-carbon chains between the imine groups for H<sub>2</sub>L<sub>1</sub>-H<sub>2</sub>L<sub>2</sub> are tetragonally elongated octahedral geometries in the resulting complexes, which may increase their potential as catalysts for different applications.

### CONCLUSION

The Schiff bases and their complexes are versatile compounds which are synthesized by the condensation of a primary amino compound with either aldehydes or ketones for industrial

**Correspondence to:** Anacona Kadhim, Department of Chemistry, University of de Oriente, Cumana, Venezuela, Email: kadhimana@de.cu.com

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applications. They can act as a catalytic oxidation of organic compounds. The oxidation catalysis has focused on how to employ the metal-catalyzed oxidation of organic substrates. The

catalytic activity of these compounds involved in Suzuki-Miyaura cross-coupling reaction of aqueous media.