

Designed μ -Chlorido-Bridged Dimanganese (II) Complexes to Mimic the Activity of Galactose Oxidase Enzyme: Application in the Dehydrogenative Oxidation of Alcohol and Aldol Reaction

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Abstract : Dual functional manganese complex compelling with 2-hydrazineylpyridine moiety as ligand relevant to the activity of galactose oxidase enzyme is synthesized. Single crystal XRD and EPR studies showed both Manganese-centers are in +2 oxidation states with μ -Chlorido-bridged between them. The catalysts have maintained stability even at 300°C temperature, as demonstrated through TGA analysis. PXRD and XPS studies were used to further characterize the catalyst structure. The catalyst (Mn-C₁) is highly efficient in the selective dehydrogenative oxidation of alcohols in the presence of oxidant 30 % aq. H₂O₂ through a radical pathway. Likewise, the catalysts (Mn-C₁ and Mn-C₄) were efficiently used in the synthesis of β -hydroxy carbonyl compounds (aldol products) and chalcones up to 90% and 95% yield, respectively, at different temperatures via C-H bond activation. Both benzylic and aliphatic substrates are explored, having functional group tolerance.

Keywords : manganese-based 2-hydrazineylpyridine complex, β -hydroxy carbonyl product, free-radical reaction, dehydrogenative oxidation, Lewis acidity

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