

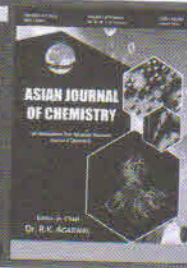


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## Polymer Immobilised Mn(II) Complex as Efficient Catalyst for High-Value Fuel Production from Hydrodeoxygenation of Bisphenol A

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A polymer-supported manganese(II) complex, PS-[Mn(L-H)(Cl)<sub>2</sub>], along with its unsupported analogue [Mn(L-H<sub>2</sub>)<sub>2</sub>(Cl)<sub>2</sub>], was synthesised and systematically characterised using elemental analysis, FT-IR, UV-Vis diffuse reflectance spectroscopy, EDAX, magnetic susceptibility measurements and thermogravimetric analysis. Spectroscopic and magnetic data indicated a tetrahedral geometry for the polymer-supported complex and an octahedral environment for the unsupported analogue, with the ligand coordinating in a bidentate chelating mode. The catalytic performance of both complexes was evaluated in the selective hydrodeoxygenation of substituted phenols, with 4,4'-(propane-2,2-diyl)diphenol (BPA) employed as a model substrate. Reaction parameters such as solvent, temperature, catalyst loading, hydrogen pressure, reaction time and substrate concentration were systematically optimised. The polymer-supported catalyst exhibited superior activity, achieving up to 99% BPA conversion with high selectivity toward propane-2,2-diyl dicyclohexane under mild conditions, while the unsupported complex showed lower activity and poor recyclability. The enhanced catalytic performance is attributed to effective metal immobilisation, improved accessibility of active sites and the heterogeneous nature of the supported system. Catalyst reusability studies confirmed stable performance over multiple cycles with negligible manganese leaching, supported by ICP-OES analysis and hot filtration tests. A plausible reaction pathway for BPA hydrodeoxygenation was proposed based on control experiments and product distribution.

**Keywords:** Polymer supported catalyst, Hydrodeoxygenation, Heterogeneous complex, Jet fuel.