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Synthesis and structural studies of Mn(II) and Zn(II) thiazole–Schiff base complexes with catalytic application in benzyl alcohol oxidation

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Manganese (II) and zinc(II) Schiff base complexes derived from salicylaldehyde and Ethyl 2-(2-amino-1,3-thiazol-4-yl)acetate have been synthesized and characterized using elemental analyses, IR and UV-Vis spectroscopy. Their catalytic activities have been assessed for the selective oxidation of benzyl alcohol employing hydrogen peroxide as a green oxidant under mild conditions. The gas chromatographic study has identified benzaldehyde as the primary product, with benzoic acid and benzyl benzoate as minor by-products. The manganese complex exhibits the superior catalytic activity, (approximately 95% selectivity) due to its redox versatility and enhanced electron-transfer capability. The study demonstrates that optimization of parameters such as reaction time, temperature, H_2O_2 concentration, catalyst loading, and catalyst type significantly influences both selectivity and conversion. With a selectivity of approximately 95%, this reaction is particularly promising for industrial applications in benzyl alcohol oxidation using environmentally benign catalysts.

Keywords: Schiff base, Metal complexes, Catalytic oxidation, Benzyl alcohol