

Efficient catalytic reduction of 4-Nitrophenol using Copper(II) complexes with N,O-chelating schiff base ligands

ABSTRACT

The reduction of 4-nitrophenol to 4-aminophenol by sodium borohydride was used as a model to test the catalytic activity of copper(II) complexes containing N,O-chelating Schiff base ligands. In this study, a series of copper(II) complexes containing respective Schiff base ligands, N'-salicylidene-2-aminophenol (1), N'-salicylidene-2-aminothiazole (2), and N,N'-bis(salicylidene)-o-phenylenediamine (3), were synthesized and characterized by elemental analysis, Fourier transform infrared (FT-IR), UV-Visible (UV-Vis) and electron paramagnetic resonance (EPR) spectroscopies. The results from the 4-nitrophenol reduction showed that 3 has the highest catalytic activities with 97.5% conversion, followed by 2 and 1 with 95.2% and 90.8% conversions, respectively. The optimization of the catalyst amount revealed that 1.0 mol% of the catalyst was the most optimized amount with the highest conversion compared to the other doses, 0.5 mol% and 1.5 mol%. Recyclability and reproducibility tests confirmed that all three complexes were active, efficient, and possess excellent reproducibility with consistent catalytic performances and could be used again without a major decrease in the catalytic activity.

Keyword: Copper complexes; Schiff base; Reduction of 4-nitrophenol