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Immobilization of zinc complexes on magnetic nanoparticles and their applications as catalyst

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In this study, a novel zinc complex immobilized covalently on $CoFe_2O_4$ magnetite nanoparticles was synthesized. The nanocatalyst was characterized thoroughly using thermogravimetric analyses (TGA), Fourier Transform Infrared (FT-IR) spectroscopy, scanning electron microscopy (SEM), energy dispersive X-ray (EDX), inductively coupled plasma optical emission spectroscopy (ICP-OES), vibrational sample magnetometry (VSM), and powder X-ray diffraction (PXRD). $CoFe_2O_4$@4-Dimethylaminopyridine (Dmap)@Zn was found to be efficient for synthesis of tetrazole at mild reaction conditions in the green medium. The influences of reaction temperature, solvent, and the amount of catalysts were studied. The best results were obtained in water and without organic solvent condition for synthesis of tetrazole. The catalyst was easily collected via an external magnetic field and further reused at least 6 times without a significant decrease in catalytic activity. The wide applicability of the catalyst, ease of catalyst separation, its reusability capacity, and importantly reaction operation in a green medium and elimination of hazardous organic solvents are the advantages of this catalyst.

Keywords: 4-Dimethylaminopyridine (Dmap), $CoFe_2O_4$ magnetite nanoparticles, synthesis of tetrazole

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