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Design, preparation, and catalytic activity of the new nanocellulose-based catalyst

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With the development of global industrial and manufacturing activities reduction of aromatic and aliphatic nitro compounds has become a more serious and critical issue. Synthetic procedures of the active nanocatalysts are toxic, expensive and harmful for envirenment. accordingly, many efforts have been devoted to achieve green methods for the synthesis of nanocatalysts, avoiding the disadvantages of currently used procedures. Therefore it is necessary to use environmental friendly catalysts. Cellulose as the most abundant natural polymer and, can be used as a renewable, biodegradable, and non-toxic support. Cellulose be used as a basic raw material for the preparation of various functional materials. Because of its strong inter- and intramolecular hydrogen bondings, cellulose is insoluble in water and most organic solvents. This restricts its chemical reactions to having to be carried out under heterogeneous conditions [1].

In this work, we utilize a Fe_3O_4-cellulose as support to immobilize copper cation as a catalytic active site [2]. The prepared Fe_3O_4-cellulose support was functionalized through simple methods to obtain a copper-based catalyst for the reduction of nitroarenes [3]. The formation of this catalyst was validated through Fourier transform infrared spectroscopy (TF-IR), X-ray diffraction (XRD), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), vibrating sample magnetometry (VSM), and thermogravimetry analysis TGA). Then, the catalytic activity of the prepared catalyst was evaluated in the reduction of various nitroarenes in the presence of sodium borohydride as a reducing agent at room temperature in aquous solution. The significant magnetic property of the nanocatalyst provides simple separation from the reaction solution by an external magnet [4].

Keywords: Heterogeneous catalysis, Cellulose, Reduction, Nitroarenes

[1] M. Kaushik, and A. Moores, *Green Chem*, 2016, 10,1039.
[2] R. Xu, H. Bi, G. He, J. Zhu, and H. Chen, *Mater. Res. Bull*, 2014, 05, 045.
[3] E. Kalantari, M. A. Khalilzadeh, D. Zareyee, and M. Shokouhimehr, *J. Mol. Struct.*, 2020, 10,1016.
[4] H, Lu et al, *Cellulose*, 2019, 10,1007.