

Fe₃O₄, Fe₃O₄@Cu Nanocatalysts for Chemoselective Reduction of 5-Nitroisophthalic Acid

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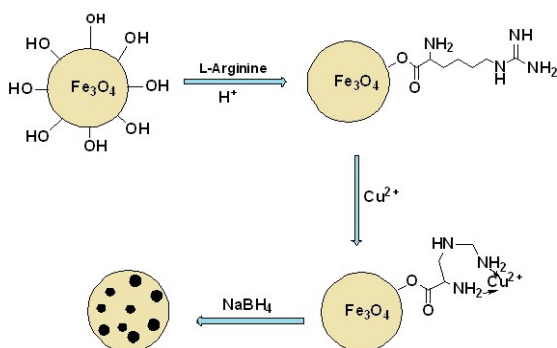
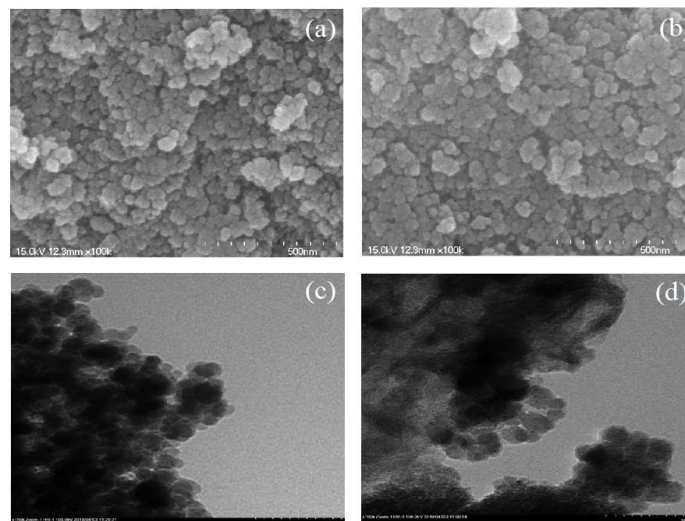
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Introduction:

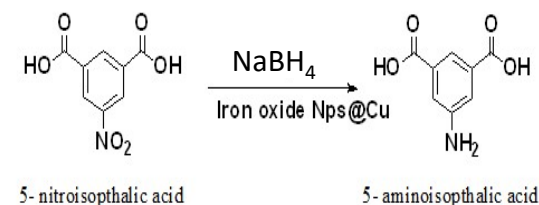
The Fe₃O₄@Cu nanocomposites were synthesized by a simple chemical reduction method by using L-arginine as a linker. The easily synthesized Fe₃O₄@Cu nanocomposites are cost-effective, easily recyclable, and do not affect environmental conditions. The time required to complete the reduction of the reaction was 15 min and the reduction that takes place in the reaction was checked by using UV-Visible spectroscopy data/graph. The stretching vibration bonding, crystallinity, particle size, elemental analysis, and magnetization were characterized by XRD, SEM and TEM respectively. The synthesized nanocomposites were used for the reduction of 5-NIPA with sodium borohydride (NaBH₄) as a reducing agent. It was found that Fe₃O₄@Cu composites show better catalytic activity than magnetite (Fe₃O₄) nanoparticles.

SEM (a, b) & TEM (c, d):

Catalyst:



Reduction:



Key features:

- Simple, Effective and easy to recycle and reuse.
- Industrial application.
- Readily available raw material used for preparing catalyst.

Conclusion:

A facile and able methodology has been established to synthesize Fe₃O₄@Cu nanocomposites using as L-arginine as a linker. The Fe₃O₄@Cu presented high catalytic activity for the reduction of 5-NIPA to 5-AIPA. The Fe₃O₄@Cu is magnetically separable and displayed a high catalytic activity after 5 cycles.

Reference: 1) G.N. Nawathe, D.S. Patil, P.R. Jadhav, D.V. Awale, A.M. Teli, S.C. Bhise, S.S. Kolekar, M.M. Karanjkar, J.H. Kim, P.S. Patil, J. Electroanal. Chem. 738 (2015) 170. 2) K. Liang, X. Tang, W. Hu, J. Mater. Chem. A 22 (2012) 11062.