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Synthesis of a new Cd-complex supported on magnetic nanoparticles and study of its catalytic activity for oxidation reactions

Taiebeh Tamoradi[1], **Mohammad Ghadermazi**[1] and **Arash Ghorbani Choghamarani**[2]
[1]University of Kurdistan, Iran
[2]Ilam University, Iran

The simplified recovery, reusability and the potential for incorporation in continuous reactors and microreactors are unique properties in organic synthesis, thus the major area of research is recently shifted toward more environment friendly catalysts. In homogeneous systems it is complicated to recover the catalyst from the final reaction mixture; thus heterogeneous catalysts are used as supports. Heterogeneous catalysts have attracted a considerable attention in synthesis of organic compounds, because of their recovery by conventional filtration or centrifugation techniques. However, recovery and recycling of the heterogeneous catalysts are difficult because they require a tedious workup via filtration and the inevitable loss of solid in the recovery process. Magnetic nanoparticles have recently proposed as ideal supports because of their multifunctional physical and chemical properties such as easy preparation and functionalization, high chemical activity, long catalytic life, large surface area ratio, excellent thermal and chemical stability, low price, less toxicity, high dispersion and easy separation via external magnet. Sulfoxides, disulfides and sulfides are useful in the chemical industries and play a vital role in some medicines and biological processes. During the recent increasing interest in synthesis of these compounds, variety of catalysts has been received considerable attention. The present work describes the synthesis of a new cadmium complex immobilized on Fe_3O_4 nanostructure as efficient catalyst for oxidation reactions. Characterization of the prepared nanostructure was performed by SEM and XRD. Use of green medium, easy separation, excellent reusability of the nanocatalyst, and short reaction time are outstanding advantages of this method.

Recent Publications

1. Tamoradi T, Ghadermazi M and Ghorbani Choghamarani A (2017) Ni(II)-Adenine complex coated Fe_3O_4 nanoparticles as high reusable nanocatalyst for the synthesis of polyhydroquinoline derivatives and oxidation reactions. Applied Organometallic Chemistry 32(1):e3974.
2. M Darabi, Tamoradi T, Ghadermazi M and Ghorbani Choghamarani (2017) A magnetically retrievable heterogeneous copper nanocatalyst for the synthesis of 5-substituted tetrazoles and oxidation reactions. Transition Metal Chemistry 42:703.
3. Zolfigol M A, Khakyzadeh V, Moosavi Zare A R, Rostami A, Zare A, Iranpoor N, Beyzavid M H and Luque R (2013) A highly stable and active magnetically separable Pd nanocatalyst in aqueous phase heterogeneously catalyzed couplings. Green Chemistry 15:2132.
4. Shiri L, Ghorbani Choghamarani A and Kazemi M (2017) Synthesis and characterization of tribenzyl ammonium-tribromide supported on magnetic Fe_3O_4 nanoparticles: a robust magnetically recoverable catalyst for the oxidative coupling of thiols and oxidation of sulfides. Res Chem Intermed 43:2707.
5. Tamoradi T, Ghorbani Choghamarani A and Ghadermazi M (2017) Fe_3O_4–adenine–Zn: A novel, green, and magnetically recoverable catalyst for the synthesis of 5-substituted tetrazoles and oxidation of sulfur containing compounds. New Journal of Chemistry 41:11714.

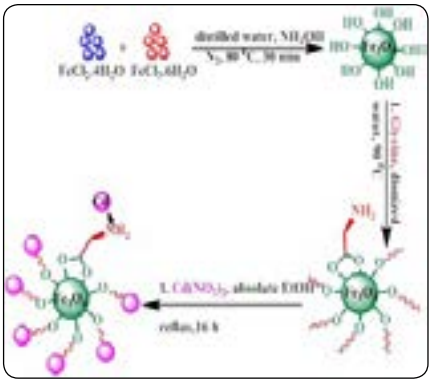

Figure 1: General route for the fabrication of Fe_3O_4-Glycine-Cd.

Biography

Taiebeh Tamoradi obtained her Master's in Inorganic Chemistry from Ilam University in 2012. In 2014, she joined Kurdistan University as a PhD candidate. After a two-year Postdoctoral Research position in Kurdistan University, she moved to the University of Ilam to join the Chemistry Science Group under Professor Arash Ghorbani Choghamarani.

t.tabss@yahoo.com