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Alkylation activity of ball-milled synthesized highly active Nanoparticles Supported on Porous Materials

Farveh Saberi[a,b], Ana Franco[a], Rafael Luque[a]

[a] Departamento de Quimica Organica Universidad de Cordoba Campus de Rabanales, Edificio Marie Curie, Ctra N. IV-A, Km 396, 14014, Cordoba (Spain)
[b] Department of Chemistry, Faculty of Sciences, University of Sistan and Baluchestan PO Box 98135-674, Zahedan, Iran
e-mail: farveh.saberilemraski@gmail.com

Supported nanoparticles on porous materials have attracted a great deal of attention in recent years due to their unique stabilizing and orientating effect. In this regard, they possess a high surface area which make them more efficient and diverse for various applications including sensors, biomedicine and catalysis. Recent research efforts have been directed to the preparation of economic, available, and relatively non-toxic nanoparticles (e.g., iron oxides) in particular. Several methodologies have been attempted to achieve the deposition of transition metal nanoparticles onto nanoporous supports [1].

Al-SBA-15 is a class of materials which possess an ordered and aligned mesochannels. Hence, SBA materials are promising candidates to support catalytically active transition metal-based nanoparticles to design advanced catalysts. Among transition metal-based nanoparticles, magnetic iron oxide nanoparticles supporting into Al-SBA in the form of a composite can deliver an advanced bifunctional catalyst which has both acid and redox sites simultaneously [2].

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Mechanochemical protocols, including mechanical milling and alloying have been reported to synthesizea list of nanomaterials [3].This strategy is also potentially efficient for the synthesis of nanostructures through a number of welding, particle deformation, and fracturing effects. Herein, we wish to report a facile and efficient one-step mechanochemical approach to the synthesis of highly active and well dispersed iron oxide nanoparticles supported on mesoporous aluminosilicates (e.g., Al-SBA-15, with a ratio of Si/Al=20). Their catalytic behavior was monitored in the microwave-assisted alkylation of toluene using benzyl chloride under ambient conditions.

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References

[1] White, R.J., et al., Supported metal nanoparticles on porous materials. Methods and applications. Chemical Society Reviews, 2009. 38(2): p. 481-494.
[2] Polshettiwar, V., et al., Magnetically recoverable nanocatalysts. Chemical reviews, 2011. 111(5): p. 3036-3075
[3] Tsuzuki, T. and P.G. McCormick, Mechanochemical synthesis of nanoparticles. Journal of materials science, 2004. 39(16-17): p. 5143-5146.