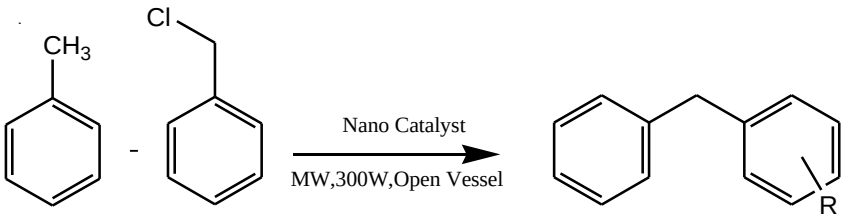
Functionalized Sulfonic Acid on Supported Nanocatalysts: Synthesis, Characterization and Applications in Alkylation Reactions

Somayeh Ostovar[a,b], Ana Franco[a], Alina M. Balu[a], Antonio A. Romero[a], Rafael Luque[a]

[a] *Departamento de Química Orgánica, Universidad de Córdoba.*
[b] *Sistan and Balouchestan University, Iran*
e-mail: Somayeh_Ostovar2266@yahoo.com

Significant efforts have been paid recently in the modification of homogeneous catalysts, used in highly selective organic transformations to address various economic and environmental issues [1]. The attachment of the functional groups on semiconducting metal oxide surfaces such as magnetic iron oxide nanoparticles (Fe_3O_4 or Fe_2O_3 NPs) has been proposed since these nanomaterials ensure the preservation of enzyme biological activity, molecular complexes and metal nanoparticles. Inherent properties of functionalized -SO3H-modified mesoporous silicas and organosilicas yield materials with different hydrophilicities include good reusabilities, and high activity [2]. In this work, we prepared magnetic nanocatalysts (Fe-SBA-15) fo9llowing a previous procedure from the group [3] followed by functionalisation with sulfonic acid groups by ball milling. The alkylation of toluene with benzyl chloride, selected as test reaction, proceed significantly more effectively on SO_3H-modified mesoporous nanocatalysts, as compared to Fe-SBA-15 magnetic mesoporous supports. The structure and texture of the materials obtained were characterised by classical methods (XRD diffraction, TEM, porosimetry, SEM and Diffuse Reflectance IR.



Scheme 1. Investigated microwave-assisted alkylation of toluene with benzyl chloride using magnetically functionalised nanocatalysts

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References

[1] Kharissova, O. V.; Dias, H. R.; Kharisov, B. I., Magnetic adsorbents based on micro-and Nana-structured materials. RSC Advances 2015, 5 (9), 6695-6719.
[2] Sharma, R. K.; Dutta, S.; Sharma, S.; Zboril, R.; Varma, R. S.; Gawande, M. B., Fe 3 O 4 (iron oxide)-supported nanocatalysts: synthesis, characterization and applications in coupling reactions. Green Chemistry 2016.
[3] Pineda, A.; Balu, A. M.; Campelo, J. M.; Luque, R.; Romero, A. A.; Serrano-Ruiz, J. C., High alkylation activities of ball-milled synthesized low-load supported iron oxide nanoparticles on mesoporous aluminosilicates. Catalysis today 2012, 187 (1), 65-69.