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Immobilization of copper complex on the surface of SBA-15: As an efficient nanocatalyst for the synthesis of pyranopyrazole derivatives

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Copper nanoparticles as catalyst is gaining immense interest due to their catalytic properties for a variety of organic reactions. However, metal-nanoparticle catalysts are still having limited uses, because of the problem associated with their separation from the products by traditional methods [1,2]. One of the currently adopted strategies is the immobilization of metal nanoparticles on solid supports, such as inorganic materials [3,4]. Among different supports, SBA-15 has been extensively applied as a heterogeneous support for the immobilization of homogeneous catalysts. Because, SBA-15 is useable at high temperatures due to its thermal stability. Moreover, SBA-15 has a large specific surface areathe large specific, high pore volume which allows supporting of huge organic ligands and metal complexes into its channels.

In this study, a new nanocatalyst was prepared by the immobilization of Cu complex of 2-hydroxybenzonitrile as ligand on ordered mesoporous silica (SBA-15). The proposed catalyst (SBA-15@HBN-Cu) was characterized by FT-IR, XRD, BET, TGA, EDX, and SEM and was successfully applied in the synthesis of pyranopyrazole derivatives. Pyranopyrazoles exhibit significant biological properties such as anticancer, antimicrobial, antiinflammatory and antiviral [5, 6]. These catalysts can be recovered and reused for several runs without significant change in their catalytic activity or copper leaching.

Keywords: SBA-15, Copper, Green catalyst, Pyranopyrazole

References

[1] H. Pan, B. Ma, L. Zhou, Y. Hu, M. Shakouri, Y. Guo, X. Liu, and Y. Wang, *ACS Sustainable Chemistry & Engineering*, **2023**, 11, 7489-7499.
[2] X. Wu, G. Zhao, Y.Ruan, K. Feng, M. Gao, Y. Liu, and X. Sun, *ACS Applied Bio Materials*, **2023**, 6 (5) , 2003-2013.
[3] K. Kuroda, T. Ishida, M. Haruta,and J. Mol. *Catal. A: Chem*. **2009**, 298, 7–11.
[4] H. Wu, Z. Liu, X. Wang, B. Zhao, J. Zhang,and C. Li, *Colloid Interface Sci*, **2006**, 302,142–148.
[5] M. Nikoorazm, B. Tahmasbi, S. Gholami, P. Moradi, *Applied Organometallic Chemistry* **2020**, 34(11), e5919.
[6] P. Moradi, M. Hajjami, *New Journal of Chemistry* **2021**, 45,2981-2994.