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Design, preparation and characterization of Zr(O)@Creatine@KIT-6 nanoparticles as a nanocatalyst for the synthesis of various tetrazole derivatives

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In the last few years, immobilization of homogeneous catalysts on various solid supports with the advantage of catalysts separation and recycling have been widely studied in many divergent areas of research [1,2]. Among different nanoparticles, mesoporpus silica is commonly employed as a heterogeneous support for the immobilization of homogeneous catalyste [3].

KIT-6 is a relatively new structure of mesoporous silica with thick expanded walls, thermal stable, open porosity and very accessible to guest species and metal complexes.Therefore, due to the mentioned unique properties of mesoporous KIT-6, it can be used as a suport for the synthesis heterogeneous catalysts.

In this work, the synthesized KIT-6 was modified by 3-chloropropyltrimethoxysilane (CPTMS). Then creatine was immobilized on its surface (creatine@KIT-6). Finally, zirconium dioxide was fabricated on creatine@KIT-6 (Zr(O)@creatine@KIT-6). The obtained catalyst was identified by IR, BET, XRD, EDS, SEM and TGA methods and further it was investigated in the synthesis of tetrazole derivatives. All products were obtained with high yield and purity which indicates the high catalytic activity of this catalyst.

Keywords: KIT-6, Heterogeneous catalysts, Mesoporous materials, Tetrazole, Creatine



Scheme 1. Synthesis of 5-substituted 1H-tetrazoles catalyzed by Zr(O)@creatine@KIT-6 nanocatalyst

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