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Magnetic hybrid of cyclodextrin nanosponge and polyhedral oligomeric silsesquioxane: Efficient catalytic support for immobilization of Pd nanoparticles

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Abstract

For the first time a novel magnetic catalyst was prepared through hybridization of functionalized cyclodextrin nanosponges and octakis(3-chloropropyl)octasilsesquioxane followed by incorporation of Pd and magnetic nanoparticles. The resulting composite, was utilized as an efficient heterogeneous catalyst for promoting Sonogashira and Heck reactions in the absence of any ligand and co-catalyst under mild reaction condition. Comparison of the catalytic activities of the control catalysts and the catalyst confirmed that cyclodextrin nanosponges was more efficient support than cyclodextrin. Moreover, the hybrid catalyst showed superior catalytic activity compared to those obtained from the individual components, indicating the contribution of both hybrid components to the catalysis. Furthermore, it was

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found that incorporation of magnetic nanoparticles could improve the catalytic performance. The Study of the recyclability of the catalyst showed high recyclability of the catalyst as well as low Pd leaching.

Keywords: Cyclodextrin nanosponge, Octakis(3-chloropropyl) octasilsesquioxane, Pd nanoparticles, Coupling reactions