Preparation of Ag-doped g-C₃N₄ Nano Sheet Decorated Magnetic γ -Fe₂O₃@SiO₂ Core–Shell Hollow Spheres through a Novel Hydrothermal Procedure: Investigation of the Catalytic activity for A₃, KA₂ Coupling Reactions and [3 + 2] Cycloaddition

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Abstract

Taking advantage of both g-C₃N₄ and magnetic core-shell hollow spheres, for the first time a heterogeneous and magnetically separable hybrid system was prepared through a novel and simple hydrothermal procedure and used for immobilization of bio-synthesized Ag(0) nanoparticles. The hybrid system was fully characterized by using SEM/EDS, FTIR, VSM, TEM, XRD, TGA, DTGA, ICP-AES, BET and elemental mapping analysis. The catalytic utility of the obtained system, h-Fe₂O₃@SiO₂/g-C₃N₄/Ag, for promoting ultrasonic-assisted A₃, KA₂ coupling reactions and [3 + 2] cycloaddition has been confirmed. The results established that the catalyst could efficiently catalyze the reaction to afford the corresponding products in high yields in short reaction times. The reusability study confirmed that the catalyst could be recovered and reused for at least five reaction runs with only slight loss of the catalytic

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activity. The hot filtration test also proved low silver leaching, indicating the heterogeneous nature of the catalysis.

Keywords: [3 + 2] cycloaddition, A³ and KA², coupling g-C₃N₄, magnetic nanoparticles