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Facile and Efficient Synthesis 2*H*-indazolo[2,1-b]phthalazine-triones Derivatives Using Fe_3O_4/eggshell/CS@HSO_4 NPs as a heterogeneous and recyclable nanocatalyst

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In this paper, a facile and efficient method for the synthesis of 2*H*-indazolo[2,1-b]phthalazine-triones based on the acid-catalyzed multicomponent reaction of dimedone, hydrazine, and phthalic anhydride with aldehydes reported in the presence of Fe_3O_4/eggshell/CS@HSO_4 in solvent-free. We have synthesized a new nanocomposite material in which eggshell membranes act as nucleation sites for the precipitation of Fe_3O_4/eggshell/CS@HSO_4 nanoparticles in the attendance of an external magnetic field. In the next step anchoring a chlorosulfonic acid on the surface of eggshell-coated magnetic nanoparticles as solid waste was transformed into a magnetic biomaterial, green, cheap, and environmentally friendly catalyst (Fe_3O_4/eggshell/CS@HSO_4). Techniques such as FT-IR, VSM, FESEM, TEM, EDX, XRD, and TGA characterized the as-synthesized catalyst. The catalytic property of the as-prepared catalyst was examined in synthesizing 2*H*-indazolo[2,1-b]phthalazine-triones [1-3].



Keywords: 2*H*-indazolo[2,1-b]phthalazine-triones, Eggshell, Multicomponent Reaction, and Nanocatalyst.

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