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Gly-Pyrrole@SO_3 coated on the surface of Fe_3O_4 (Fe_3O_4@Gly-Pyrrole@SO_3H) as a new recyclable magnetic nano-catalyst for the synthesis of 2-amino-3-cyano-4*H*-pyrans and polyhydroquinolines

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Abstract

The researchers of this study synthesized a new magnetic solid acid catalyst by processing Fe_3O_4 with glycine, pyrrole-2-carbaldehyde, and sulfuric acid as an acid group via a simple method. Its chemical structure was determined through a variety of analyses, including Fourier transform infrared spectroscopy, vibrating sample magnetometer, thermal gravimetric/derivative thermal gravimetric, field emission scanning electron microscope, energy-dispersive X-ray spectroscopy (EDX), EDX-mapping, transmission electron microscopy, inductively coupled plasma, X-ray diffraction, and Brunauer–Emmett–Teller. Following this, this efficient strong solid acid catalyst was used for the synthesis of of 2-amino-3-cyano-4*H*-pyran and polyhydroquinoline derivatives (84–95% yield in 5–30 min and 88–96% in 5–15 min, respectively). The nano-catalyst could be easily separated from the reaction mixture using a permanent magnet and utilized up to five times without experiencing any significant decrease in its catalytic activity. The implementation of this method offers several benefits including effortless separation, excellent catalytic activity, environmentally friendly reaction conditions, relatively high product yield, and low cost. Moreover, the recent research has demonstrated the notable antiviral effects of certain pyran and quinoline derivatives against COVID-19.

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