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Process design and development for the synthesis of a novel series of 4, 5-dihydro-1H-pyrazol-3-yl system catalyzed by titania nanoparticles

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Recent advancements have shown that nitrogen containing heterocyclic compounds is explored extensively for their diverse pharmacological actions. In particular, pyrazoline ring containing N-N bond linkage is considered to be the key factor in biological activities; also isoniazid is a well-known first line antitubercular drug for the treatment of Mycobacterium tuberculosis. Reports have shown that introduction of amido ether functionality into the parent framework enhances the biological action of the compounds. Therefore, it was thought worthwhile to synthesize a molecular framework embracing these structural motifs. Further, the use of titania nanoparticles (TiO2 NPs) has been explored for various organic reactions. The present communication elicits the application of TiO2 NPs as heterogeneous catalyst for the synthesis of a novel series of pyrazolyl derivatives derived from isoniazid. TiO2 NPs have been synthesized using modified sol-gel method and characterized by SEM, TEM, XRD and FTIR techniques. A series of pyrazolyl derivatives has been synthesized by condensation of novel series of (4-cinnamoylphenoxy)-N-(phenyl) acetamide with isoniazid using TiO¬2 NPs. The synthesized derivatives were characterized by FTIR, NMR, Mass and elemental analysis. TiO2 NPs manifested remarkable catalytic activity in synthesizing the target compounds in good yield ranging from 68-80%. The effect of catalyst particle size was also investigated. Yields of the product were found to decrease with increase in particle size from 16 nm to 1000 nm. Particles of size 16 nm were found to give maximum yield in short duration of time, followed by particles of size 70 nm, and whereas 200 nm and 1000 nm sized particles resulted in poor yield in same duration of reaction time. The use of catalyst in smaller amount, its recyclability up to five synthetic cycles and appreciable yields of the target compounds are the noteworthy features of this synthetic protocol.

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