An expeditious one-pot synthesis of 4-arylidene-isoxazol-5-(4*H*)-ones catalysed by nanostructured zinc oxide

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Background: The isoxazol ring is an important fragment of biological compounds in medicinal chemistry including anticonvulsant, antifungal, HDAC inhibitory, analgesic, antitumor, antioxidant, antimicrobial, anti-inflammatory, anticancer, antiviral, antituberculosis, antimycobacterial, hypoglycemic, and immunosuppressive [1-4]. 4-Arylidene-isoxazol-5(4H)-ones, on the other hand, are considered as the bases for the design and construction of merocyanine dyes which are used in optical recording and nonlinear optical research. Nowadays, nanoparticles are widely used in various fields, such as electronics, optics, photocatalysts, textiles, and proteomics. Nano-ZnO as heterogeneous catalyst has received considerable attention because of its inexpensive, non-toxic, and eco-friendly [5].

Methods: The ZnO nanoparticles (ZnO NPs) were synthesized and applied to synthesis of 4-arylidene-isoxazol-5(4*H*)-ones by the three-component reaction of different aryl aldehydes, hydroxylamine hydrochloride, and *β*-oxoesters in water at room temperature.

Results: To obtain a better yield, we have optimized the reaction conditions by changing the different reaction parameters. Based on the results of the optimization of reaction conditions, 4 mol% of the ZnO NP in water at room temperature (RT) proved to be the best conditions for the synthesis of 4-arylidene-isoxazol-5(4*H*)-ones. The experimental procedure is simple and a variety of aryl aldehydes containing different substituents reacted in this MCR to provide excellent product yields within short time periods.

Conclusion: A facile one-pot multicomponent protocol has been demonstrated for the synthesis of bio-active 4-arylidene-isoxazol-5(4*H*)-one derivatives at room temperature using ZnO NPs as catalyst. The present procedure is environmentally benign as the catalyst is non-toxic and reusable, reactions were implemented at RT in a green solvent (water); therefore, the use of toxic, volatile, and hazardous solvents has been avoided.

Keywords: Three-component reaction, isoxazol-5(4*H*)-one, Green, Nano-ZnO.

References

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