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Three component one-pot synthesis of dihydropyrano[3,2-c]chromenederivatives in the presence of $Zn(OAC)_2.2H_2O$ as an efficient catalyst

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Background and Aims: Pyrano [3,2-c] chromene derivatives are a class of important heterocycles with a wide range of biological properties such as spasmolytic, diuretic, anticoagulant, anti-cancer, and anti-anaphylactic activity. Moreover they can be used as cognitive enhancers, for the treatment of neurodegenerative diseases, including Alzheimer's disease, amyotrophic lateral sclerosis, Parkinson's disease, Huntington's disease, AIDS associated dementia and Down's syndrome as well as for the treatment of schizophrenia and myoclonus In addition, aminochromene derivatives exhibit a wide spectrum of biological activities including antihypertensive and anti-ischemic behavior. Also, a number of 2-amino-4H-pyrans are useful as photoactive materials.
Methods: A solution of an aromatic aldehyde (1 mmol), malononitril (1 mmol), 4-hydroxycoumarin (1 mmol) and Zn(OAC)2.2H2O in H2O and EtOH (4:1,5 ml) was stirred under heating conditions for appropriate time. After completion of the reaction which was monitored by TLC, the mixture was cooled to room temperature. The solid product was collected by filtration, washed with water and aqueous ethanol and purified by recrystallization from ethanol.
Results: During initial exploratory reactions, we studied the synthesis of 2-Amino-4-(4-chloro-phenyl)-3-cyano-4H,5H-pyrano[3,2-c] chromene-5-one from the condensation of 4-hydroxycoumarine, 4-chloro-benzaldehde and malononitrile in the presence of a variety of solvents and catalysts to optimize the reaction conditions. All the aforementioned reactions delivered excellent product yields and accommodated a wide range of aromatic aldehydes bearing both, electron-donating and electron-withdrawing substituents.
Conclusions: In conclusion, we have reported an easy, expensiveness, efficient and green protocol for the synthesis of 3,4-dihydropyrano[c] chromene derivatives in water and EtOH conditions. The method offers marked improvement with its operational simplicity, clean, low reaction time and high yields of pure products.

Keywords: Aromatic aldehyde; 4-hydroxycoumarin; Malononitril; Zinc acetate