

Synthesis of spiro[indoline-3,4'-pyridines] and spiro[indene-2,4'-pyridines] via three-component reaction

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In the diverse polycyclic 1,4-dihydropyridines (1,4-DHPs), spiro[indoline-3,4'-pyridine] is now recognized as one of the privileged heterocyclic scaffold, which attracted everlasting interests in organic synthesis, chemical biology and pharmaceutical chemistry. The cycloaddition reaction of isatinylidene malononitrile with the dipolar intermediates derived from nucleophilic additions of N-heterocyclic arenes and arylamines to electron-deficient alkynes such as acetylenedicarboxylate or propiolate provided a convenient synthetic protocol for spiro[indoline-3,4'-pyridine] derivatives. Here we developed another elegant synthetic methodology by using the 1,4-dipoles generated from N-aryaldimines and acetylenedicarboxylates. The three-component reaction of α,β -unsaturated N-aryaldimines, dialkyl acetylenedicarboxylate (alkyl propiolate) and isatinylidene malononitriles (ethyl cyanoacetates) in dry acetonitrile at room temperature afforded polysubstituted spiro[indoline-3,4'-pyridines] in good yields and with high diastereoselectivity. Under similar reaction conditions, the corresponding spiro[indene-2,4'-pyridines] were obtained from the three-component reactions containing 2-(1,3-dioxo-1H-inden-2(3H)-ylidene)malononitrile.

