Asymmetric organocatalyzed synthesis of dihydropyrano[3,2-*b*]pyrroles

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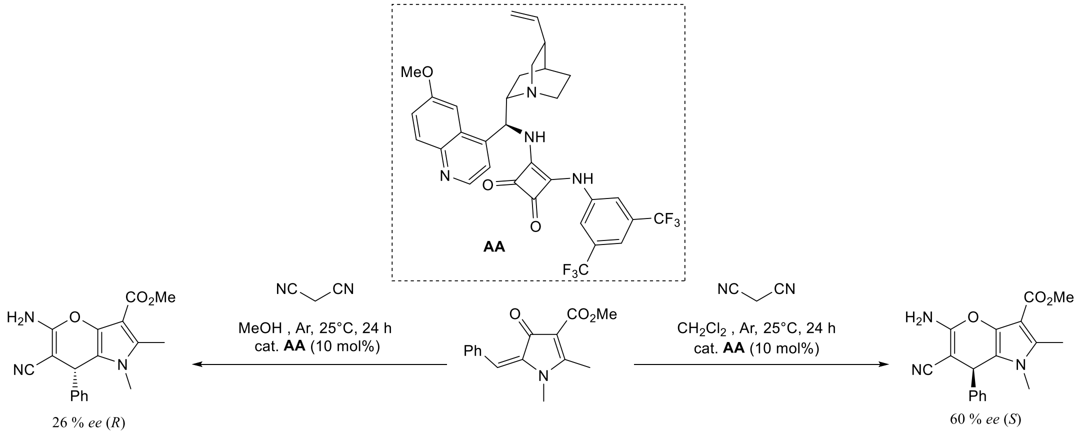
The asymmetric synthesis of potentially bioactive chiral molecules attracts considerable attention in organic synthesis.[1] Pyrrolone (Δ^2-pyrrolin-4-one) as a building block in asymmetric synthesis is an alternative to the established pyrazzolone synthon.[2] Arylidene pyrrolin-4-ones already gave good results in asymmetric sulfa-Michael/aldole reactions.[3]

In this work, the asymmetric tandem Michael addition/cyclization reaction of arylidene pyrrolin-4-ones with malononitrile gave dihydropyrano[3,2-*b*]pyrroles with moderate enantioselectivity (18 examples).The enantioselectivity depends on the nature of the substrate and the conformation of the catalyst, which in turn depends on the solvent (0–77% ee in dichloromethane, 11–44% ee in methanol). The enantiomeric excess of the products could easily be improved (≥95% ee) as a consequence of self-disproportionation of enantiomers (SDE).[4] The reaction mechanism, involving two pseudo-enantiomeric organocatalyst conformations was investigated by experimental and quantum chemical methods.



Scheme: Solvent dependant, organocatalyzed formation of dihydropyrano[3,2-*b*]pyrroles.

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