Catalytic enantioselective cyclopropanation from ethyl diazopyruvate and 1,3-dienes with Ru(II)Pheox

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The cyclopropane is the smallest and most constrained cycloalkane, and its introduction into bioactive molecules can affect their conformation, and hence their biological properties. The cyclopropyl ring is one of the most frequently encountered cycles in the drugs structure approved by the FDA.[1] In this context, developing new synthetic strategies is essential to access new cyclopropyl-containing scaffolds. One of the most efficient approaches is the [2+1] cycloaddition, i.e. the cyclopropanation of alkenes.[2] The first catalytic enantioselective cyclopropanation reaction was reported by Nozaki using a copper(II)-catalyst, styrene, and ethyl diazoacetate.[3] Since then, new catalysts and reaction conditions have been developed to obtain outstanding enantiomeric excess. In the literature, the enantioselective cyclopropanation of 1,3-dienes is less described. During the last four decades, different catalysts were used to promote the synthesis of cyclopropanes from 1,3-butadienes such as rhodium(II) acetate, copper, dinickel, or palladium.[4] Recently, the group of Che developed a chiral ruthenium porphyrin-catalyzed asymmetric cyclopropanation of 1,3-dienes with *tert*-butyl 2-cyano-2-diazoacetate, obtaining a good enantioselectivity.[5] Nevertheless, only three publications report the cyclopropanation between 1,3-dienes and diazopyruvates, based on the synthesis method of Mueller,[6] but none is enantioselective. In this context, we decided to develop an enantioselective synthesis strategy of cyclopropanes from ethyl diazopyruvate (EDPv) and dienes. To catalyze the reaction, Ru(II)-(*S*)-Pheox was used, a highly stereoselective catalyst developed by Iwasa.[7]

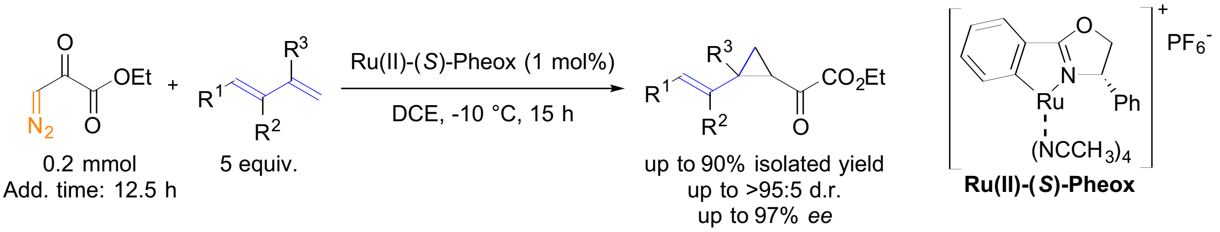

Figure: catalytic enantioselective cyclopropanation of 1,3-dienes with EDPv

References

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