Enantioselective Opening of Cyclic Vinyl Epoxides with Organometallic Reagents Catalyzed by Copper Salts

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Enantioselective copper catalyzed allylic substitution is a useful method for carbon-carbon bond formation.\(^{(1)}\) Vinylic epoxides can be considered as a subclass of allylic substrates affording useful vinylic alcohols. The kinetic resolution of racemic epoxides can easily lead to chiral vinylic alcohols. Some organometallic reagents have already been successfully used for these transformations.\(^{(2)}\) Recently, we reported the use of Grignard reagents for such a reaction on 1,3-cyclohexadiene monooxepoxide,\(^{(3)}\) thus broadly widening the scope of this reaction.

The SimplePhos ligands are able to perform the kinetic resolution of racemic cyclic vinylooxirane with moderate to good regio- and enantioselectivities and with low to good yields. We were also able to perform a regioinverted kinetic resolution with secondary Grignard reagents yielding the homoallylic alcohol with moderate yields but very high enantioselectivities. Furthermore, SimplePhos ligands allowed to use a wide range of Grignard reagents with comparable enantioselectivities than Ferrocene-based ligands.

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