

Enantioselective Photochemical Radical Addition into Electron Poor Olefins

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Abstract

Chirality has been a central focus in organic chemistry for decades, especially in the pharmaceutical industry: two enantiomers often have vastly different pharmacodynamics and pharmacokinetics. Today, many methods have been developed to obtain enantiopure compounds in thermal reactions by using chiral catalysts or chiral auxiliaries. However, for photochemical reactions, enantioselectivity is still difficult to achieve. In our work, we tried to carry out an enantioselective light-induced radical reaction with a chiral Lewis acid catalyst. Nucleophilic carbon-centered radicals can be formed through photochemical sensitization, and these can add onto electron-poor olefin-radical traps. These radical traps can be activated towards addition by Lewis acids bearing chiral ligands, which act as chiral auxiliaries. Many conditions were explored by changing wavelengths, concentrations of the photosensitizers, solution molarities and Lewis acids. Polarimetric measurements showed that only racemic mixtures were obtained in all cases.

Key words: enantiomerically pure compounds, chiral auxiliaries, stereoselective control, photochemical sensitization, electron poor olefins.

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