Asymmetric Morita-Baylis-Hillman Reaction: Catalyst Design and Mechanistic Insights

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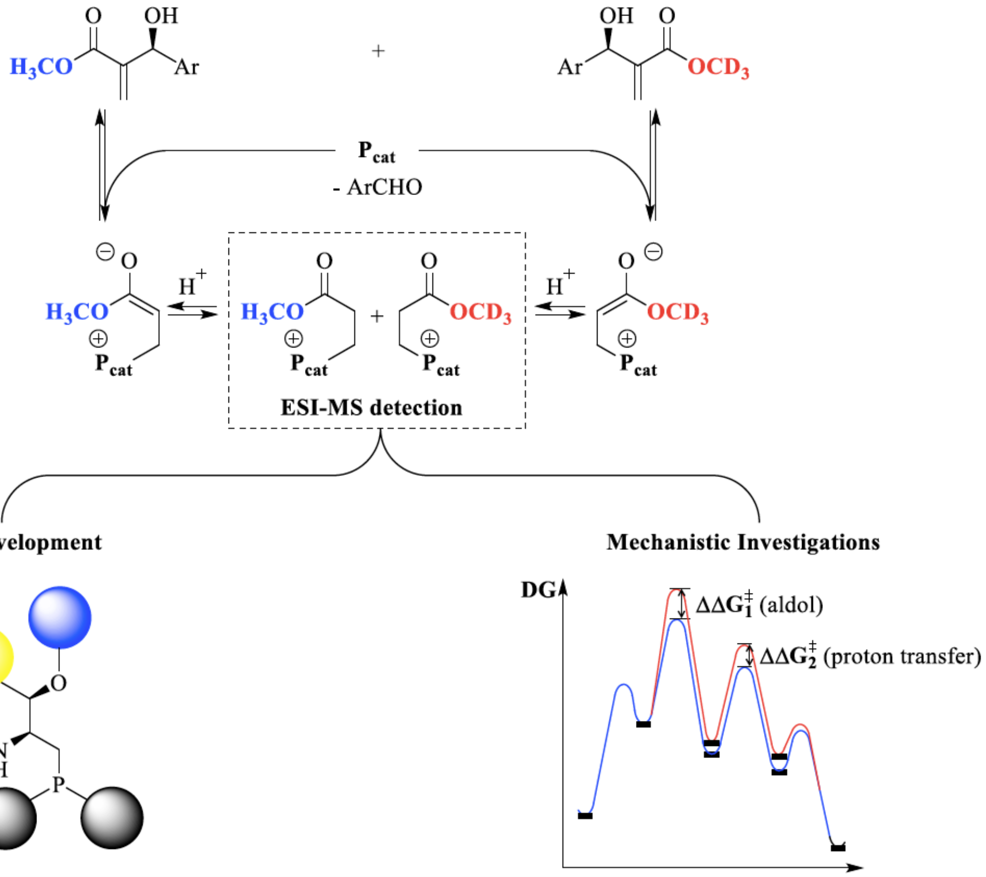
The Morita-Baylis-Hillman (MBH) reaction is a powerful method for the formation of a C-C bond between the α position of a Michael acceptor and an electrophile. The resulting products are highly functionalized building blocks, which can be easily modified in various ways. In the last decade substantial progress has been made in the development of enantioselective MBH reactions. However, although many chiral catalysts have been reported that give access to enantioenriched MBH products, their scope is generally limited. Especially for MBH reactions of simple acrylic esters with aldehydes, more efficient catalysts with a broader application range are needed. Herein we report a combinatorial approach to the development of chiral phosphine catalysts based on a mass spectrometric screening method devised in our laboratory, which has led to improved bifunctional chiral phosphine catalysts for MBH reactions of methyl acrylate with aldehydes. In addition, the data from mass spectrometric screening also allowed us to gain mechanistic insights and to identify the enantioselectivity-determining step in the catalytic cycle.[4]



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