

S39-4 Recent Development in the Chiral Brønsted Acid Catalysis

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Chiral Brønsted acid catalysis has emerged as a new type of chiral catalysis. We have designed and synthesized chiral cyclic phosphoric acid diester **1**, starting from (*R*)-BINOL. The phosphoric acid exhibited excellent catalytic activity in the addition reactions toward aldimines such as Mannich-type reaction (Scheme) and hydrophosphonylation reaction. We have found 9-membered cyclic transition state model for the Mannich-type reaction. Aza Diels-Alder reactions of aldimine with electron-rich dienes such as Danishefsky's diene and Brassard's diene were efficiently catalyzed by chiral phosphoric acid **1** to give 6-membered aza heterocycles with high to excellent enantioselectivity. Reverse electron-demand aza Diels-Alder reaction of 2-aza-diene with electron-rich alkene gave tetrahydroquinoline derivatives with excellent enantioselectivity. We wish to discuss recent development of the phosphoric acid catalysis.

