Zinc-Catalyzed Asymmetric Mannich Reaction Forming β-Amino Ketones

**Selected examples:**

- 88% yield, 99% ee, dr > 20:1
- 92% yield, 97% ee, dr > 20:1
- 94% yield, 99% ee, dr > 20:1
- 88% yield, 99% ee, dr > 20:1
- 76% yield, 96% ee, dr > 20:1
- 96% yield, 99% ee, dr > 20:1
- 89% yield, 99% ee, dr = 9:1
- 75% yield, 96% ee

**Proposed transition state:**

**Significance:** The asymmetric formation of all-carbon quaternary stereocenters in an efficient and atom economical manner has been of interest for decades. Trost and co-workers are able to display a highly asymmetric Mannich reaction forming β-amino ketones bearing a quaternary carbon stereocenter, utilizing the Zn-ProPhenol catalytic system previously prepared in the group.

**Comment:** The zinc-catalyzed Mannich reaction forming β-amino ketones proceeded in excellent yield, diastereo- and enantioselectivity. The reaction tolerated a wide range of functional groups including heteroaromatics, seven-membered rings, and sterically encumbered imines. The two-point binding of the Boc-imine to the catalyst, as seen in the proposed transition state, explains the stereochemical outcome of the reaction.