Asymmetric Rhodium-Catalyzed C–C Activation of Cyclobutanones

Significance: C–C activation is an attractive method to functionalize strained four-membered ring systems. Zhou and Dong demonstrate the utility of allenes as a formal vinyl carbenoid in a rhodium-catalyzed asymmetric intramolecular ring expansion of cyclobutanones.

Comment: An impressive substrate scope for this C–C activation protocol is demonstrated. Challenging cyclobutanone substrates such as those that are α-substituted also worked for this methodology, albeit with slightly diminished yields.

General reaction:

[Rh(C2H4)Cl]2 (5–10 mol%) or L* (24–48 mol%)

110–150 °C, 20–72 h

30–96% yield
90–99% ee racemic and enantioselective

Selected examples:

Postulated catalytic cycle:
(deuterated studies)

SYNFACTS Contributors: Mark Lautens, Charles C. J. Loh

 MidiCalcaw x 2016 © THIEME STUTTGART • NEW YORK