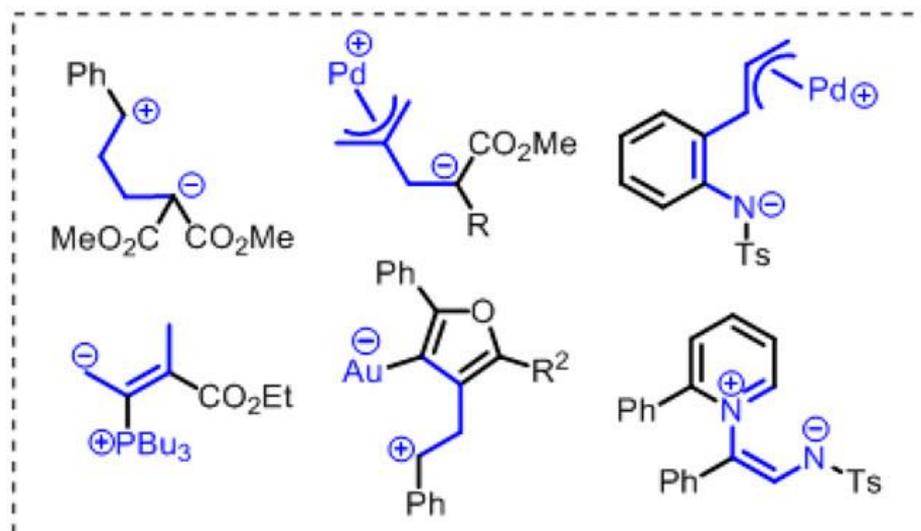
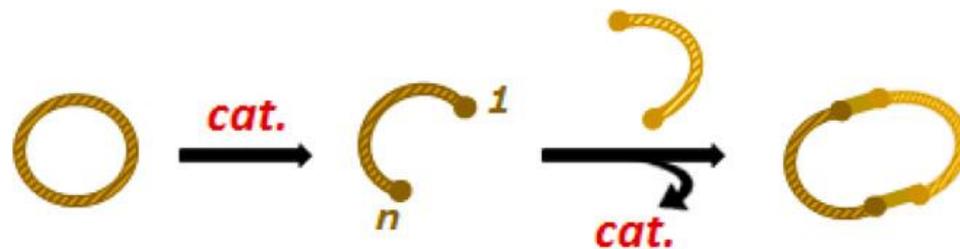


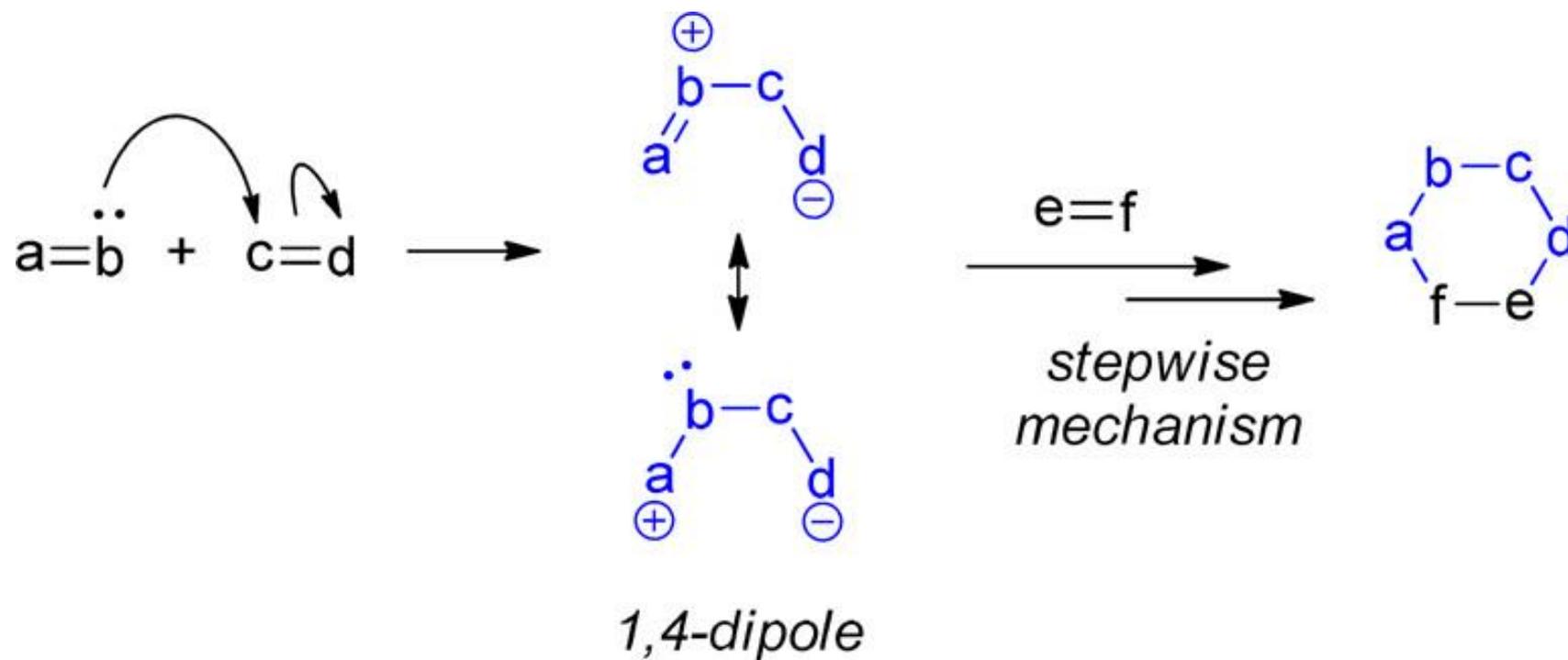
Recent Advances in the Catalytic Cycloaddition of 1,*n*-Dipoles



Reporter: XiaoBo

Supervisor: Prof. Huang

INTRODUCTION



Noncatalytic 1,4-Dipolar Cycloaddition

New York, 1969; p 223.

E. *Chem. Ber.* 1967, 100, 1094– 1106.

EXAMPLES:

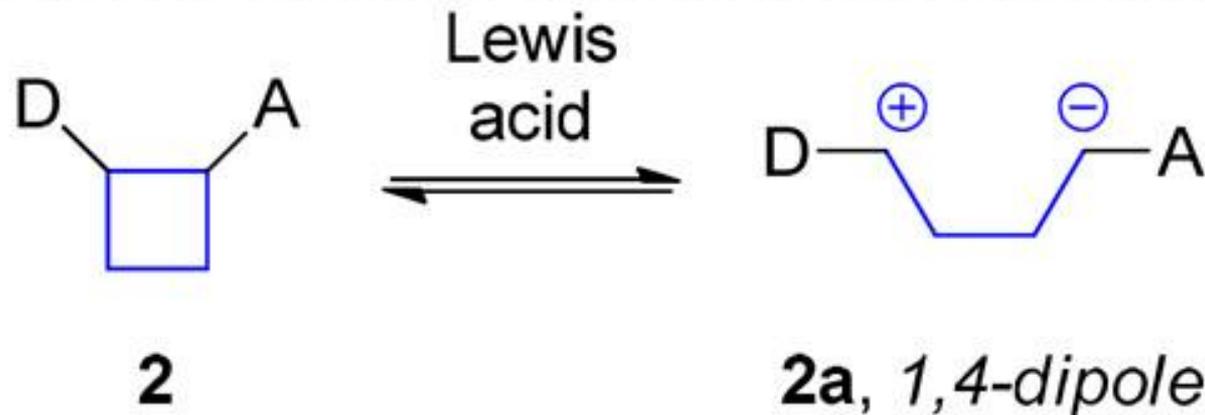
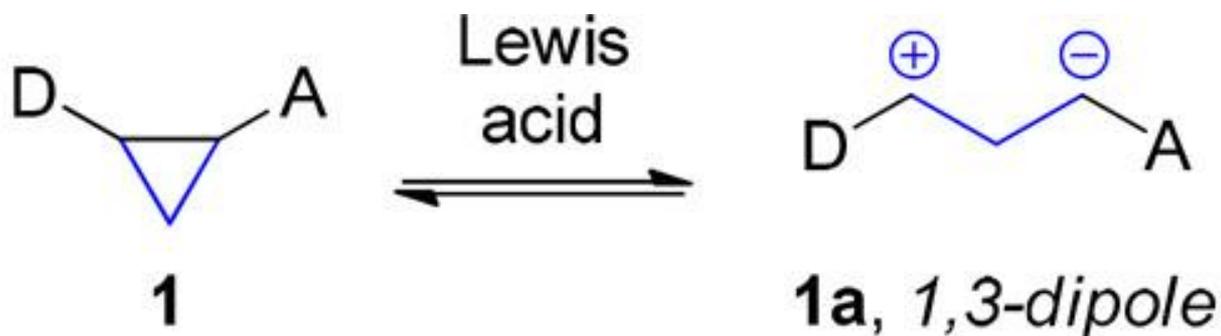
Donor–Acceptor Cyclobutanes

γ -Methylidene- δ -valerolactones

Vinyl Benzoxazinanes

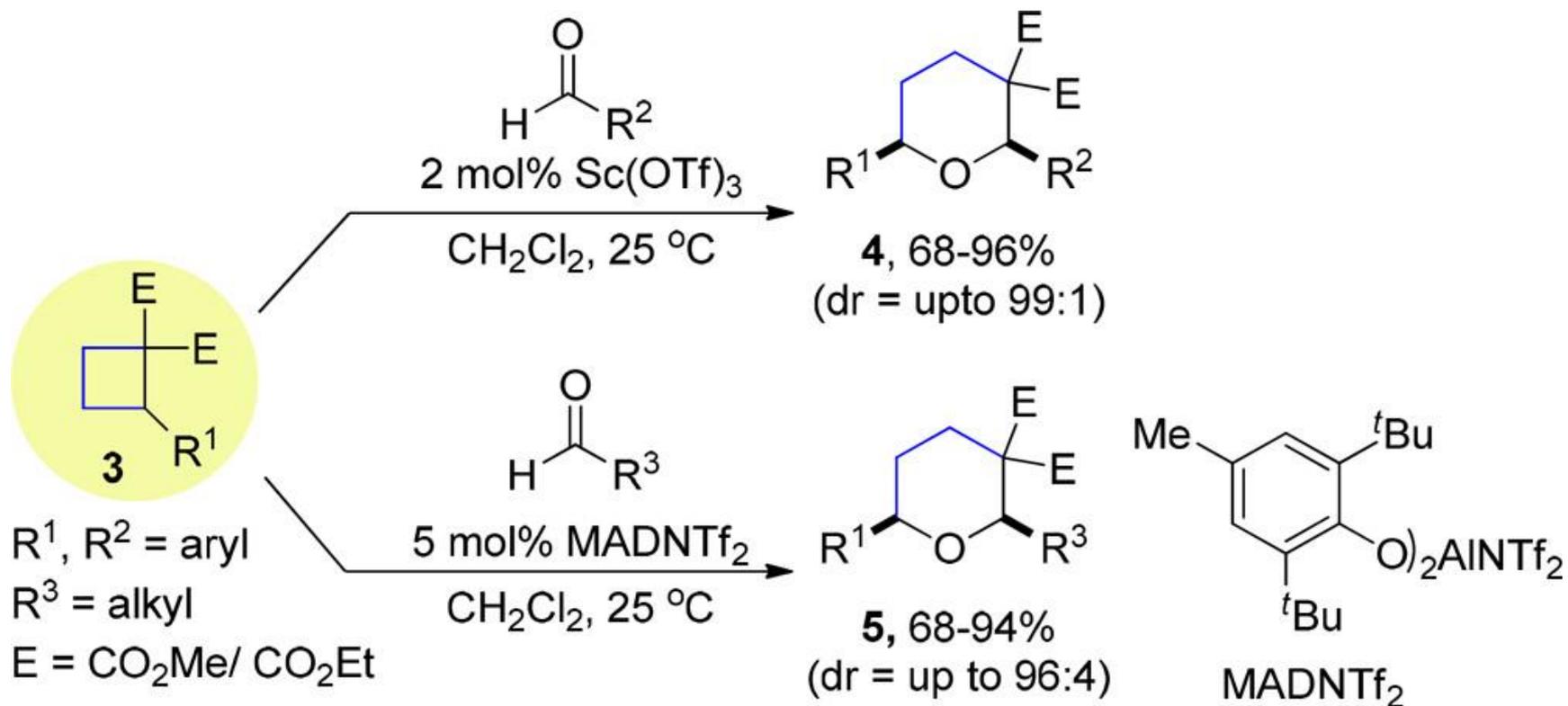
Allenoates

DONOR-ACCEPTOR CYCLOBUTANES



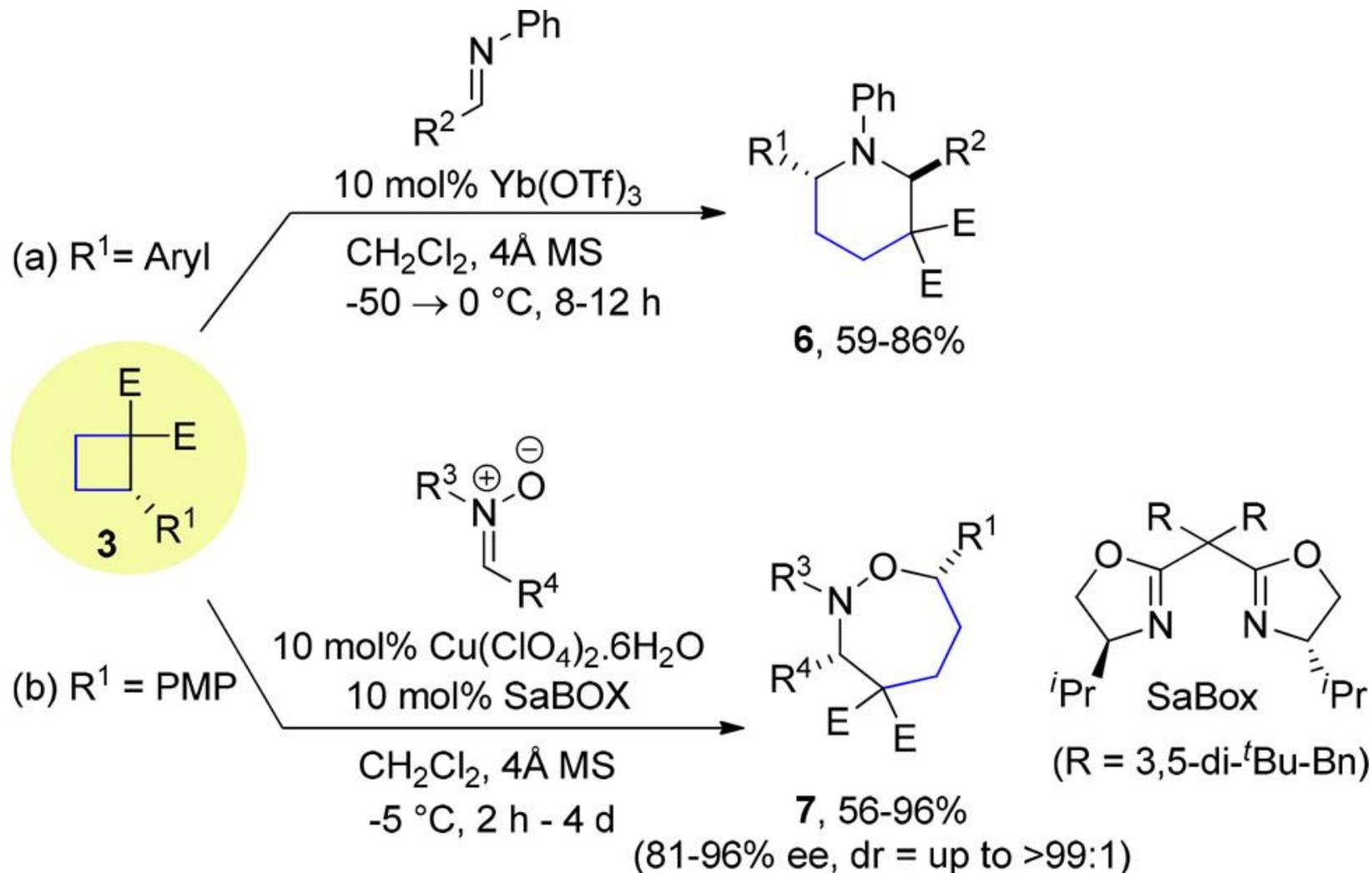
Generation of 1,*n*-Dipoles from D–A Cycloalkanes

DONOR-ACCEPTOR CYCLOBUTANES



Lewis Acid-Catalyzed [4 + 2] Cycloadditions of D–A
Cyclobutanes and Aldehydes

DONOR-ACCEPTOR CYCLOBUTANES

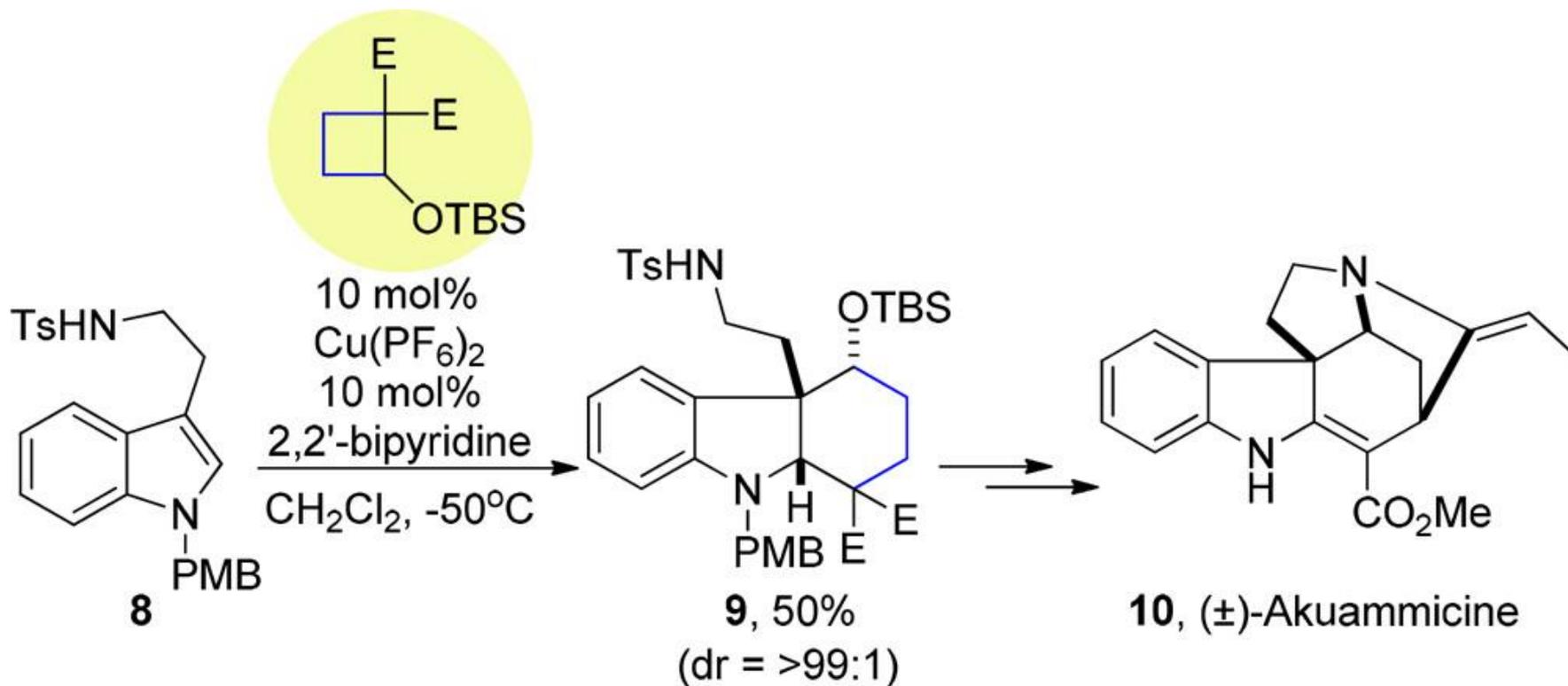


Stereoselective 1,4-Dipolar Cycloadditions of D–A Cyclobutanes

Org. Lett. 2010, 12, 4732–4735.

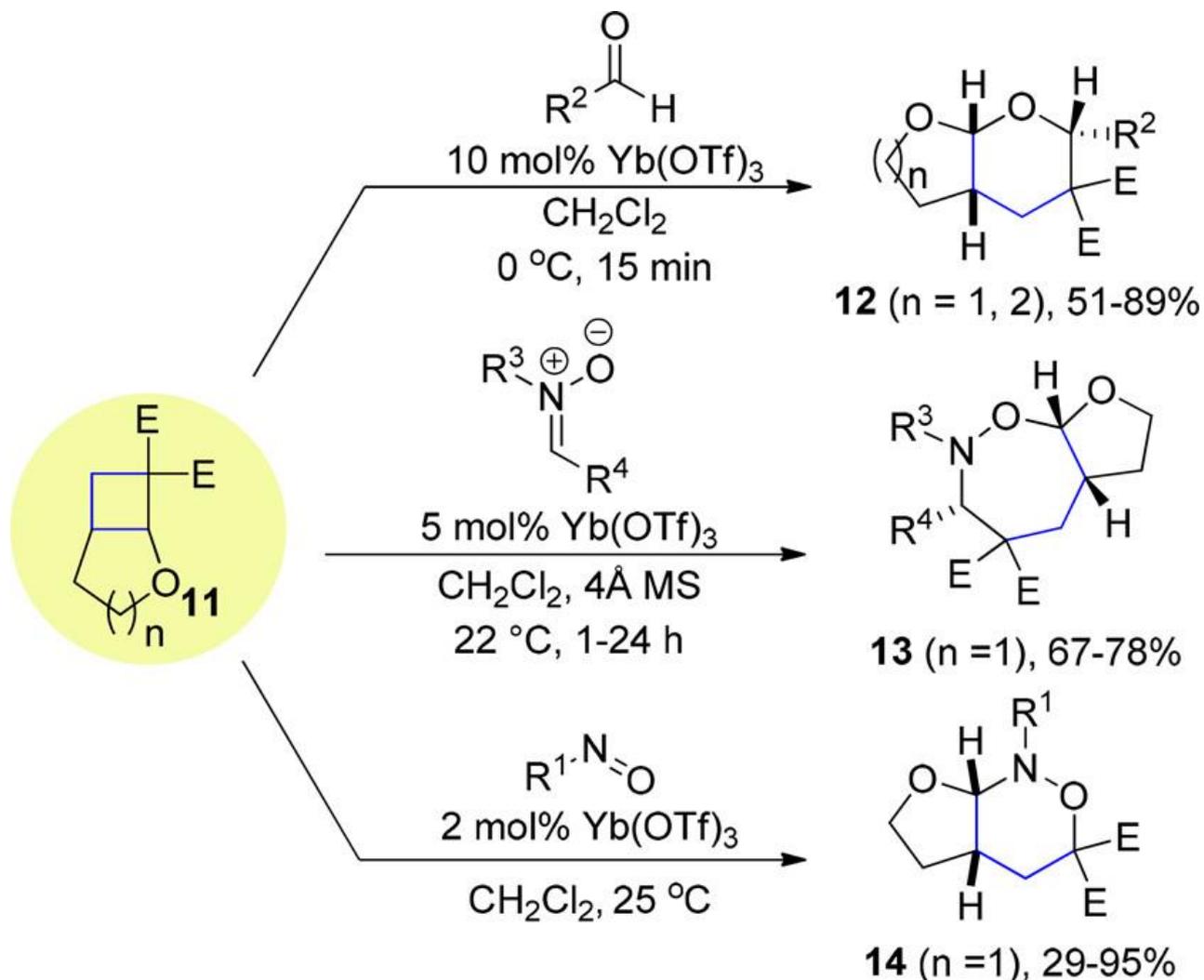
Org. Lett. 2011, 13, 1528–1531.

DONOR-ACCEPTOR CYCLOBUTANES



Synthesis of (±)-Akuammicine via [4 + 2] Cycloaddition of D–A Cyclobutane

DONOR-ACCEPTOR CYCLOBUTANES



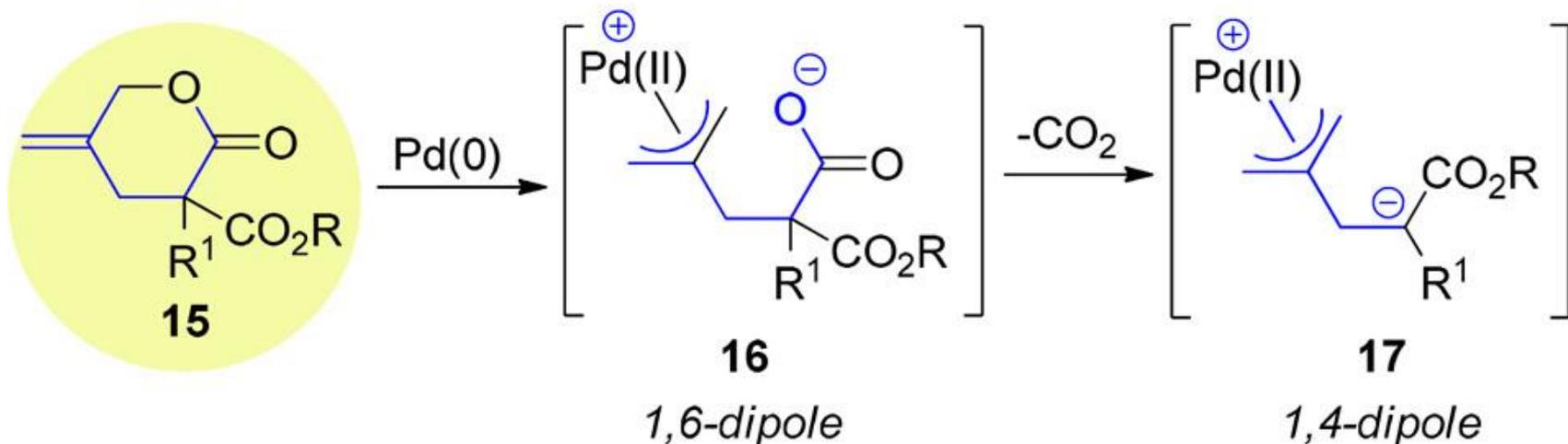
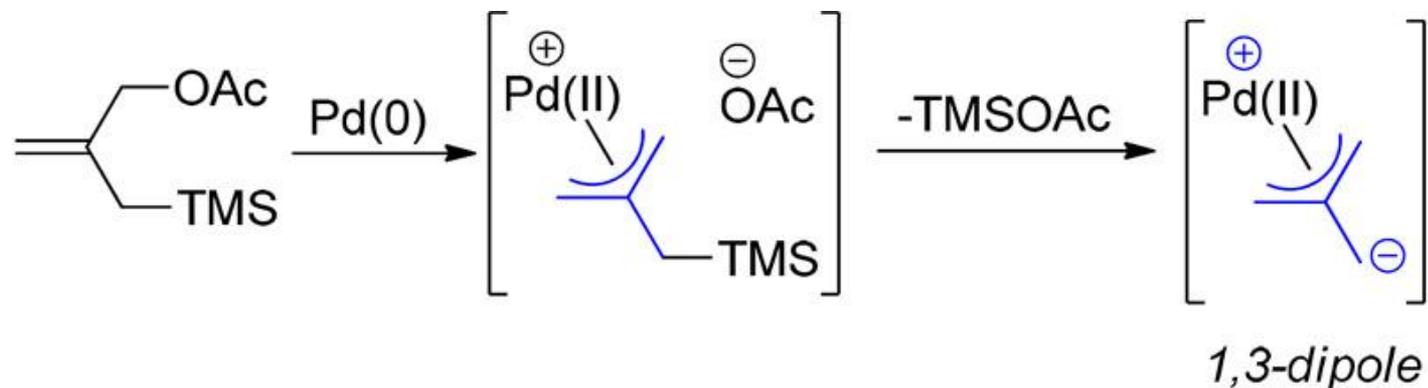
1,4-Dipolar Cycloadditions of Modified D–A Cyclobutanes

Org. Lett. 2010, 12, 4736–4738.

Org. Lett. 2011, 13, 1528–1531.

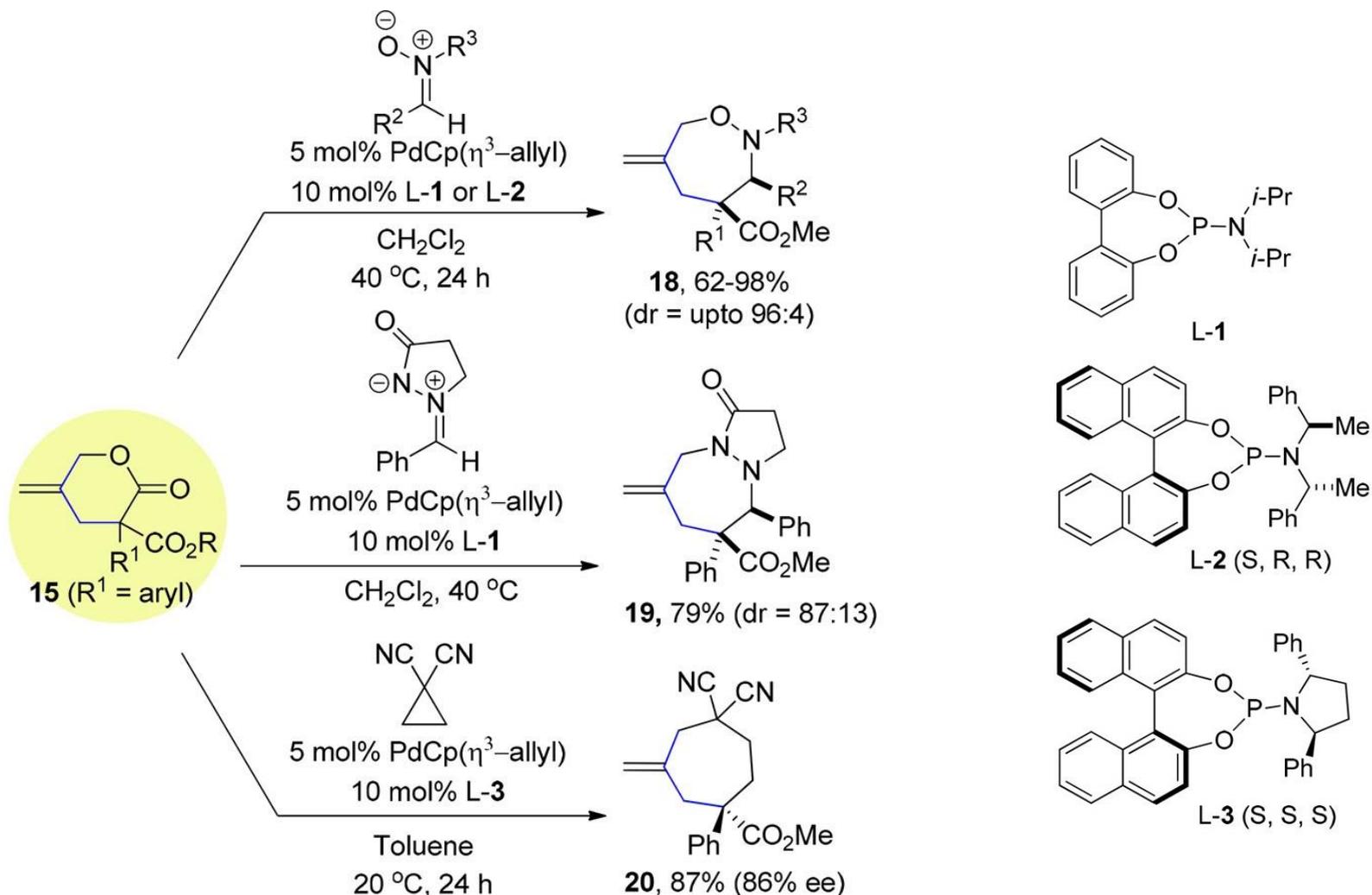
Chem. Commun. 2014, 50, 1668–1670.

γ -Methylidene- δ -valerolactones



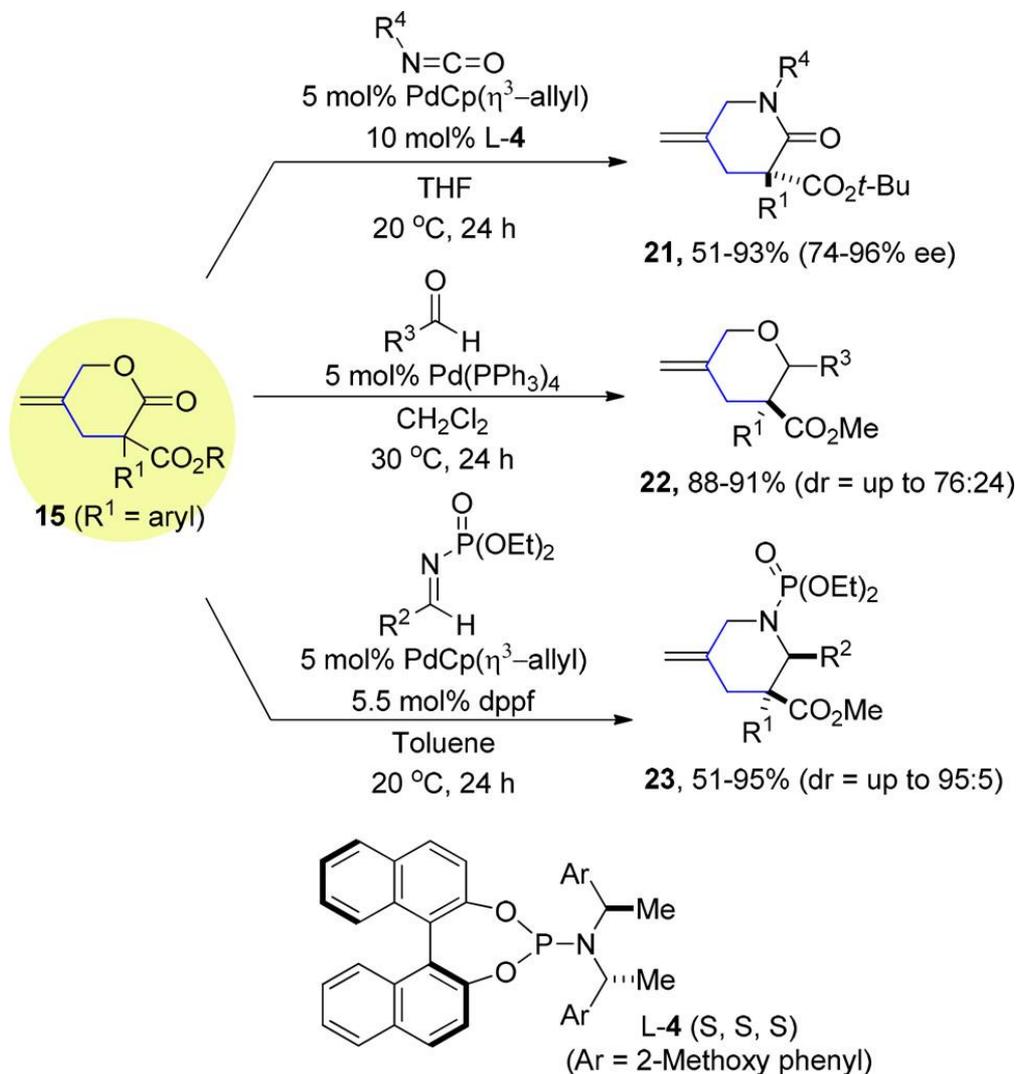
Generation of 1,4-Dipoles from γ -Methylidene- δ -valerolactones

γ -Methylidene- δ -valerolactones



[4 + 3] Cycloadditions of γ -Methylidene- δ -valerolactones

γ -Methylidene- δ -valerolactones



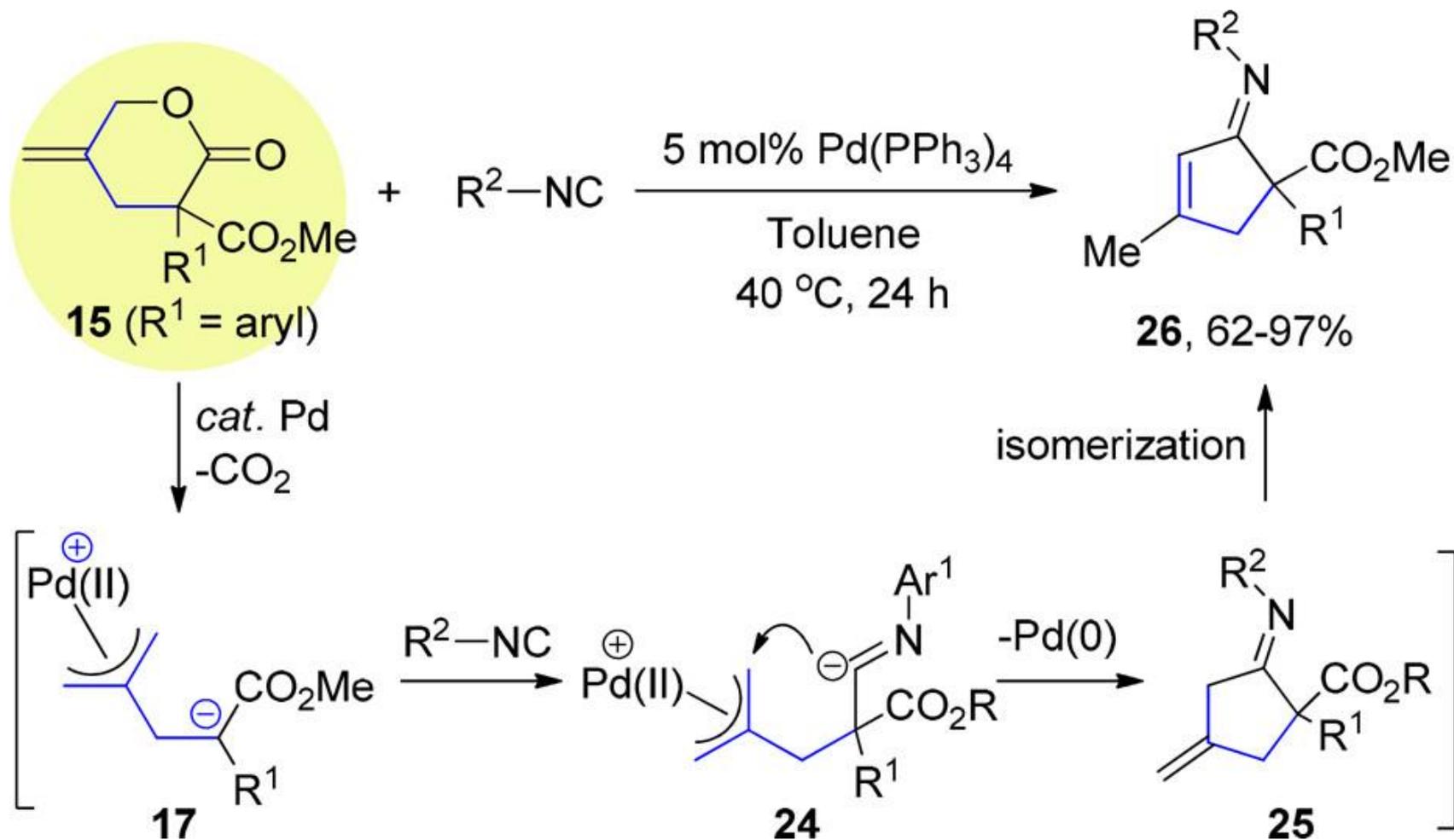
[4 + 2] Cycloadditions of γ -Methylidene- δ -valerolactones

J. Am. Chem. Soc. 2008, 130, 16174–16175.

J. Am. Chem. Soc. 2010, 132, 7508–7513.

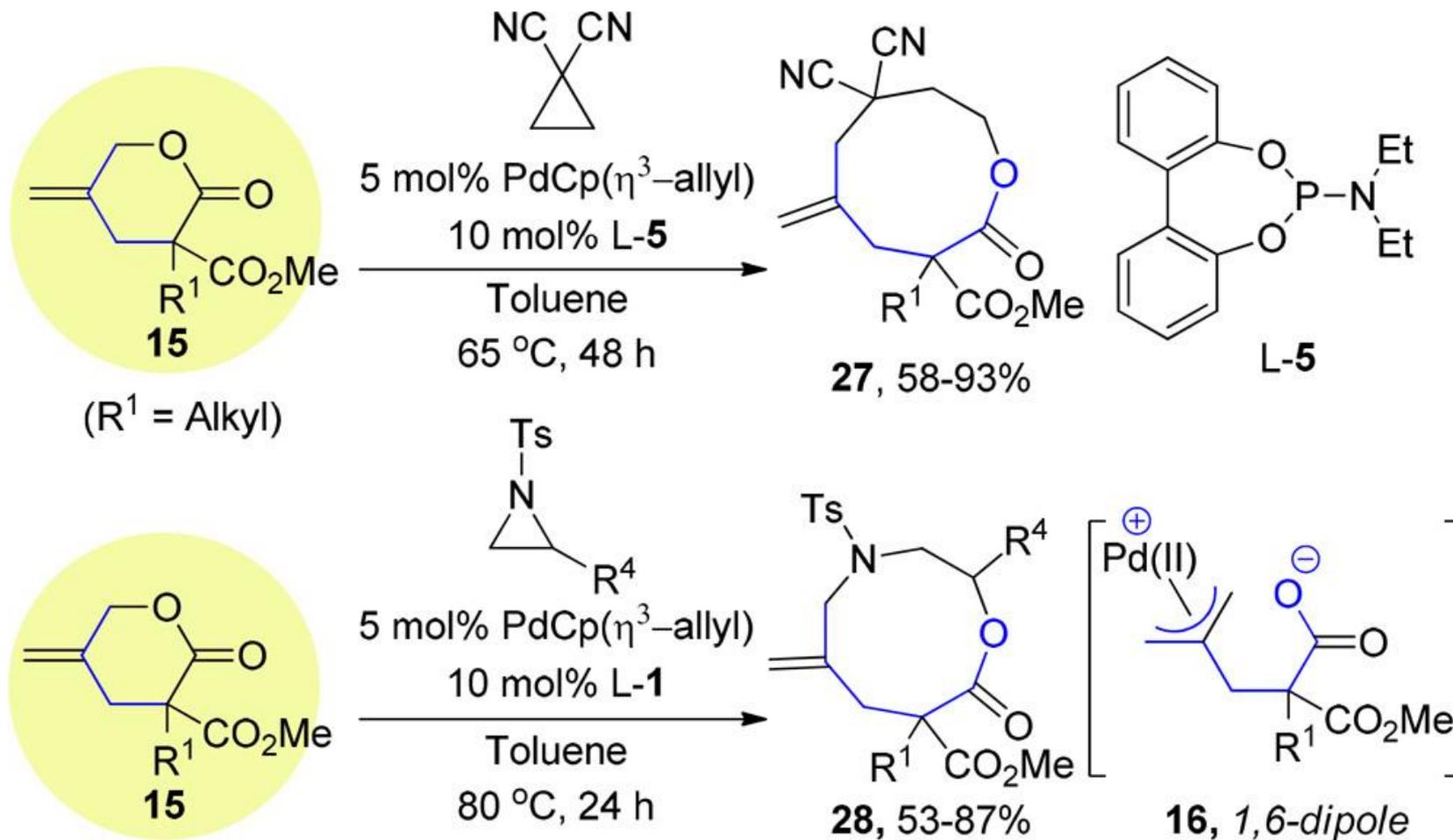
Org. Lett. 2012, 14, 2410–2413.

γ -Methylidene- δ -valerolactones



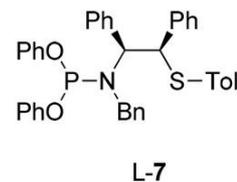
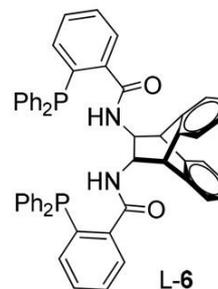
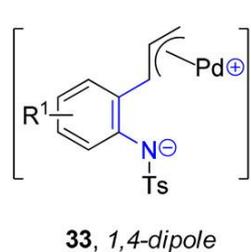
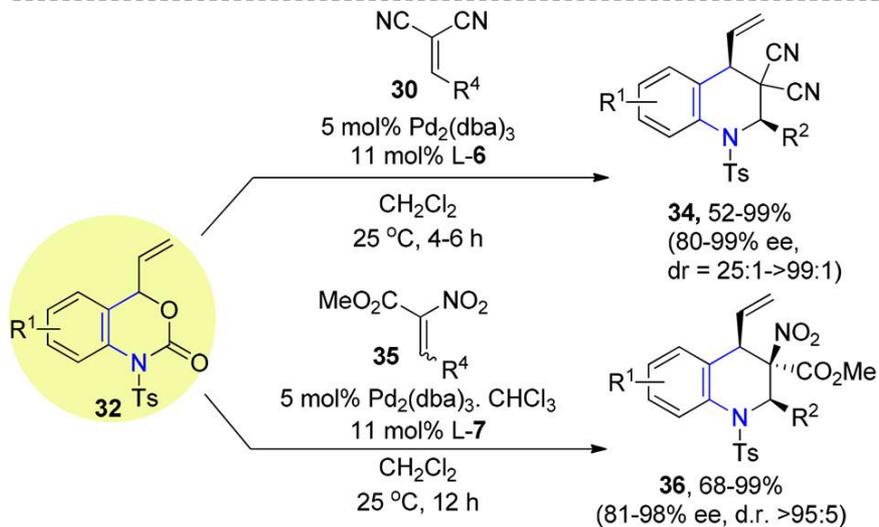
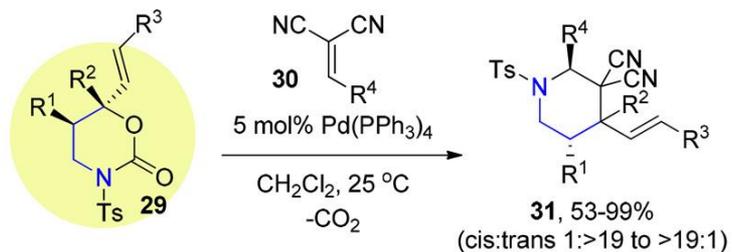
[4 + 1] Cycloaddition of γ -Methylidene- δ -valerolactones

γ -Methylidene- δ -valerolactones



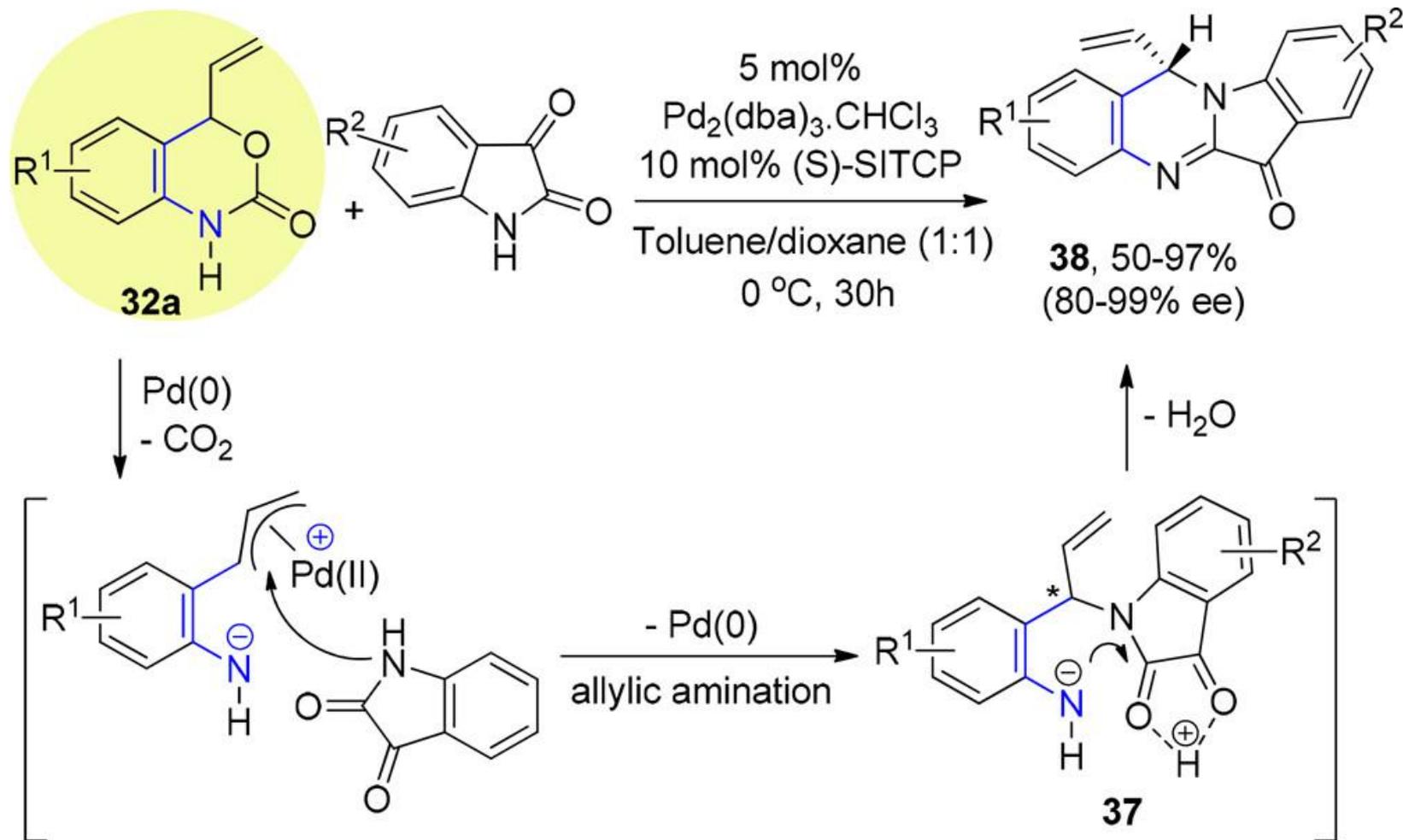
[6 + 3] Cycloadditions of γ -Methylidene- δ -valerolactones

Vinyl Benzoxazinanes



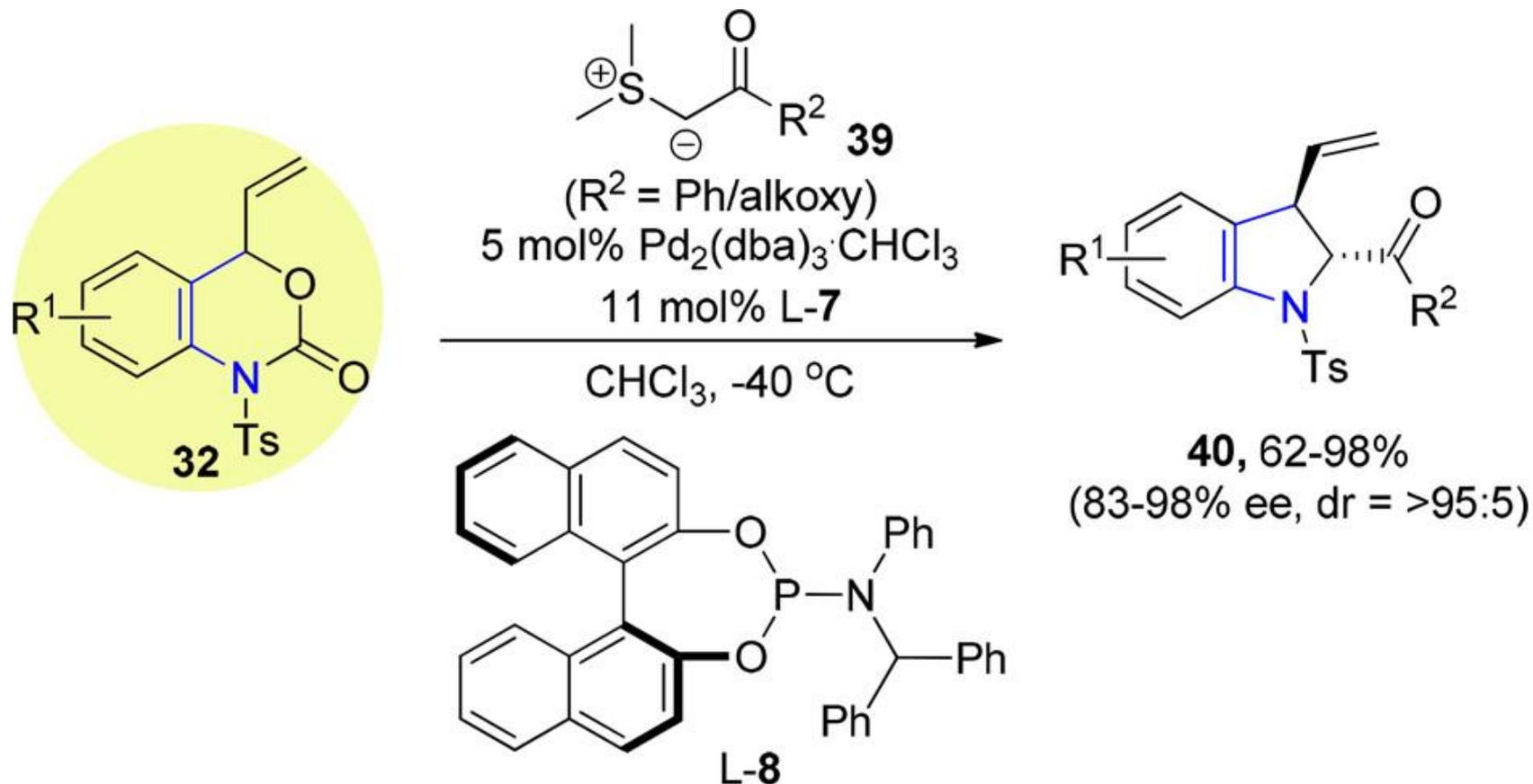
[4 + 2] Cycloadditions of Vinyl Oxazinanes

Vinyl Benzoxazinanones



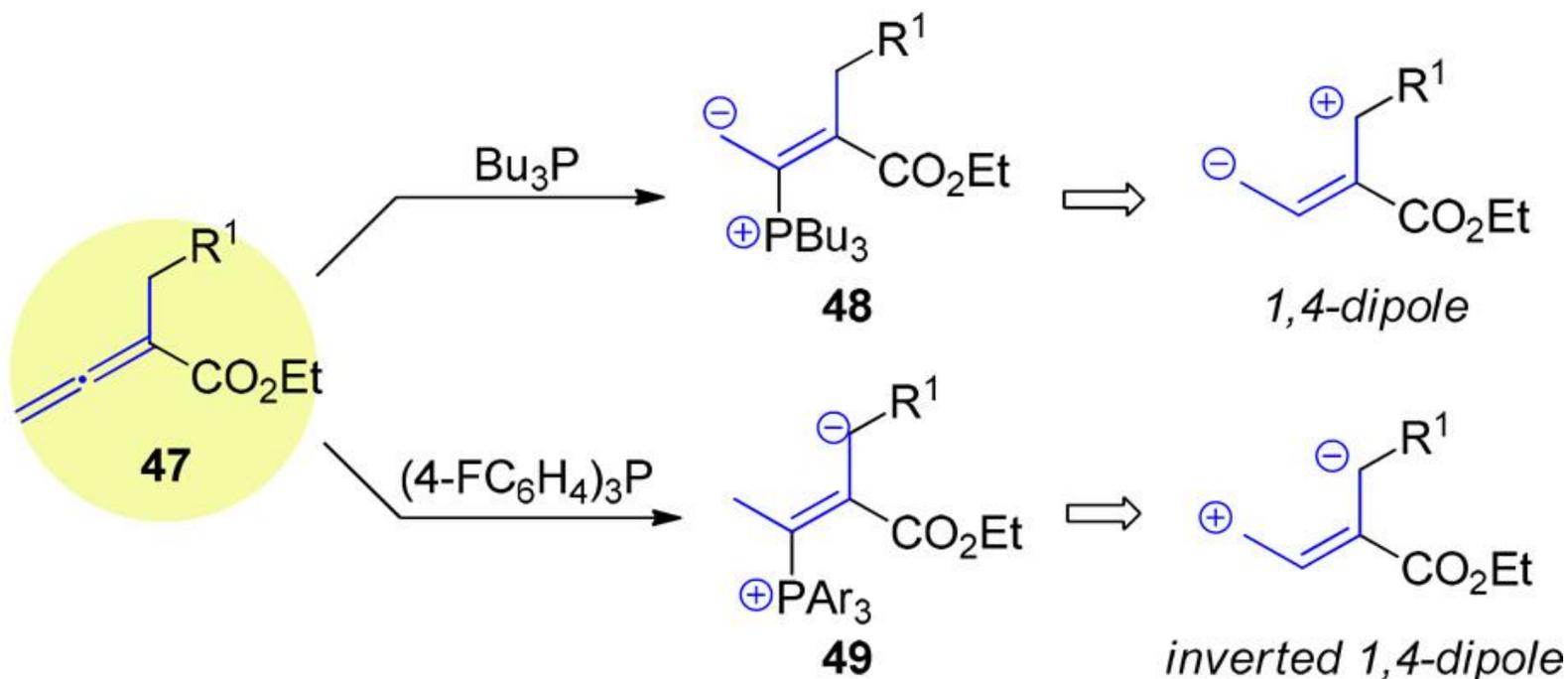
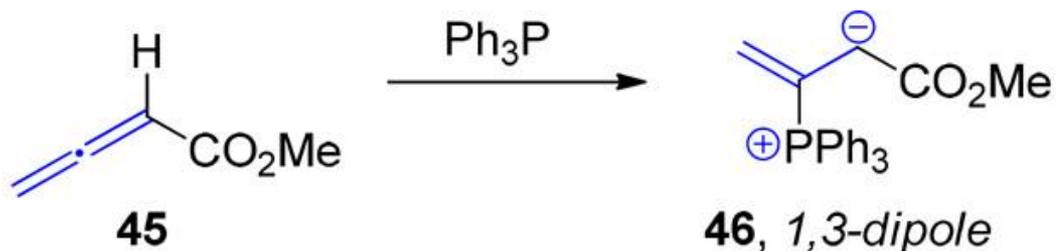
Palladium(0)-Catalyzed [4 + 2] Cycloaddition of Vinyl Benzoxazinanones and Isatins

Vinyl Benzoxazinanones



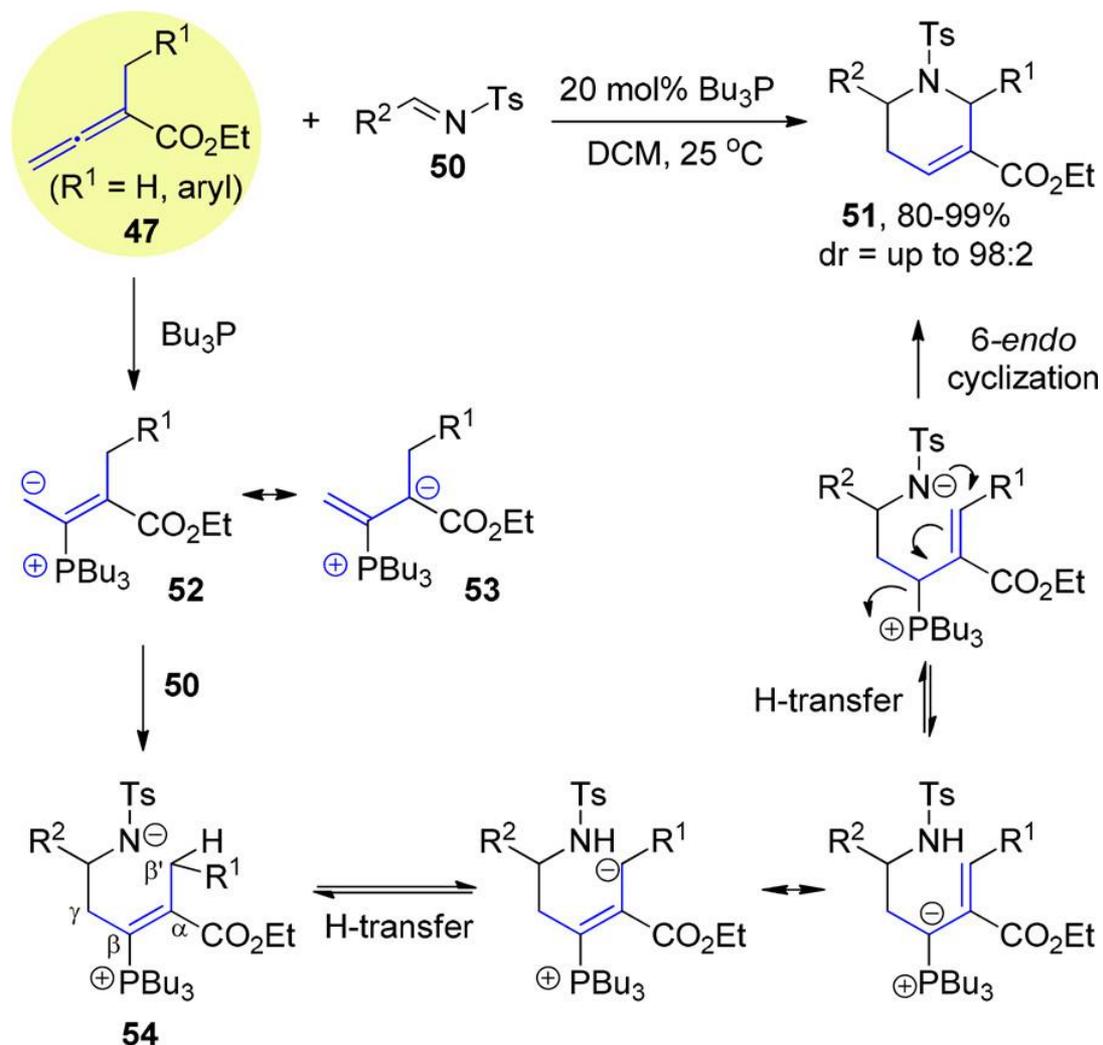
[4 + 1] Cycloaddition of Vinyl Benzoxazinones and Sulfur Ylides

Allenoates



1,*n*-Dipolar Species from Allenoates

Allenoates



Phosphine-Catalyzed [4 + 2] Cycloaddition of Allenoates and Imines

J. Am. Chem. Soc. **2003**, 125, 4716– 4717

J. Am. Chem. Soc. **2007**, 129, 12632– 12633

Summary

The use of transition metal, Lewis acid in 1,*n*-dipolar cycloaddition triggers the reaction by generating the 1,*n*-dipoles and provides the opportunity to achieve regio- and stereoselective transformations.

The development of atypical 1,*n*-dipolar cycloadditions will continue to be a leading area in synthetic chemistry toward functional cyclic compounds and natural products.

Thanks a lot.