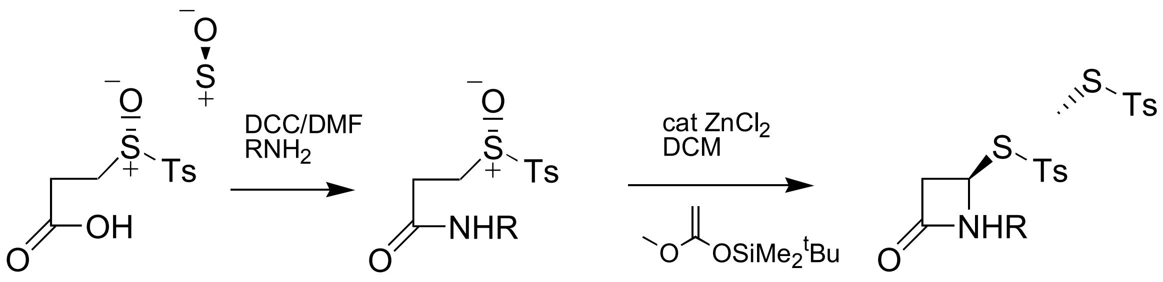
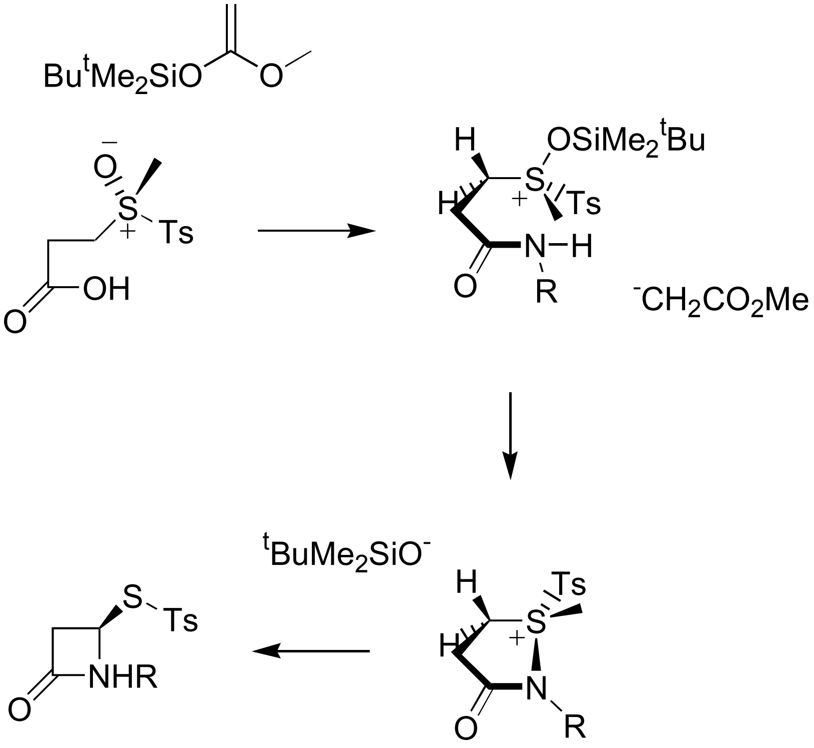
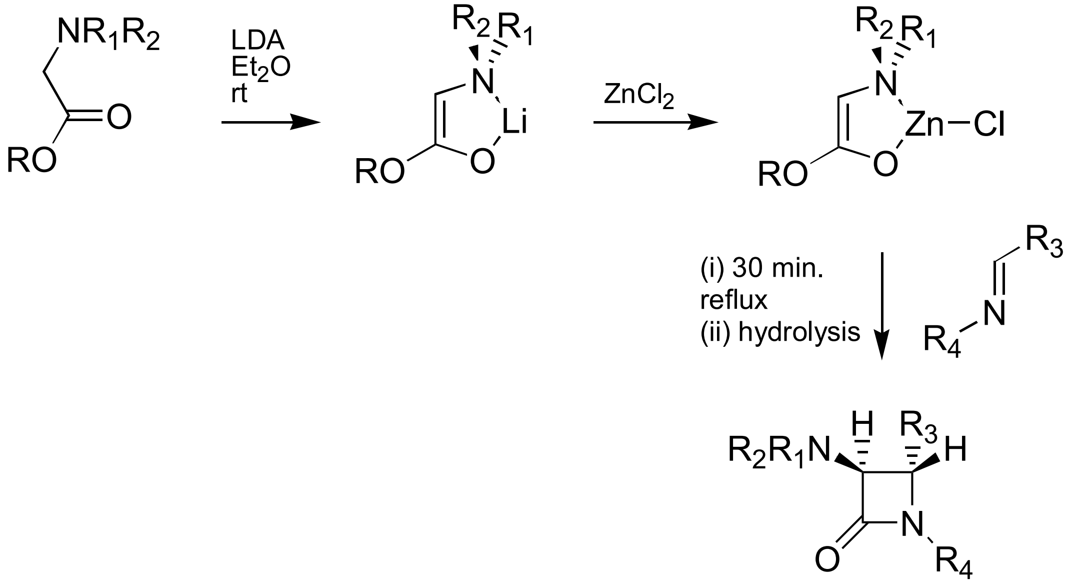
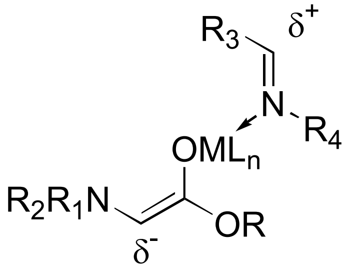


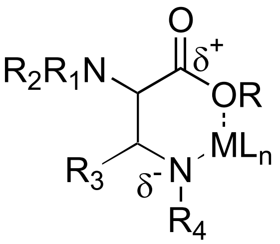


chiral sulfoxide/silyl group transfer/intramolecular sulfide leaving group/base attach sterically controlled

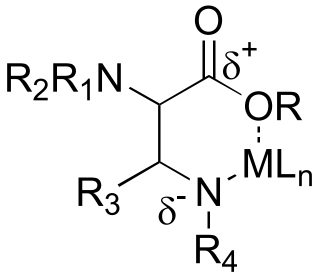
Tetrahedron Lett. 1994, **36**, 115.

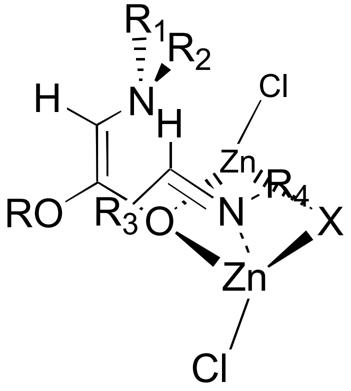




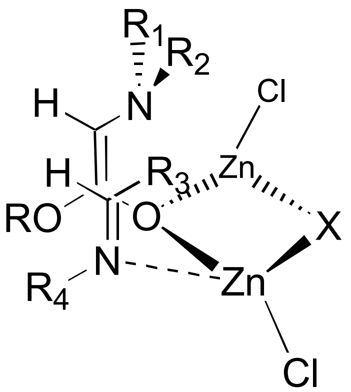


Zinc enolate plus imine/imine coordinates to metal/enolate attack of imine/cyclohexane-shaped intermediate/nucleophilic nitrogen attacks ester group resulting in beta-lactam formation.





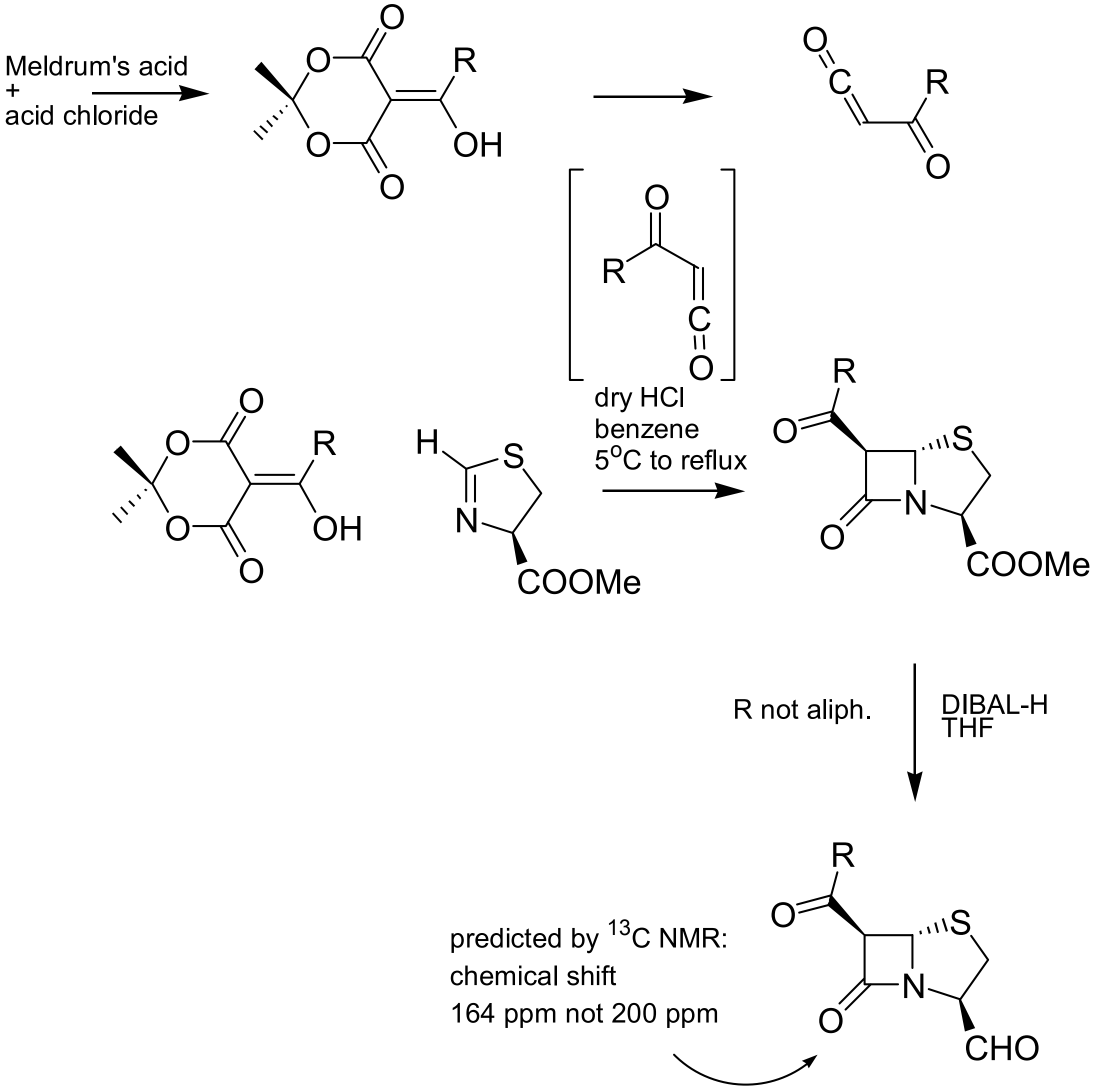
erythro/trans



threo/cis

Zn coordination prefers cis enolate/imine most often E (trans). Erythro transition state because of sterics (“eclipsed vs staggered”). Trans beta-lactams ratio >98:2.

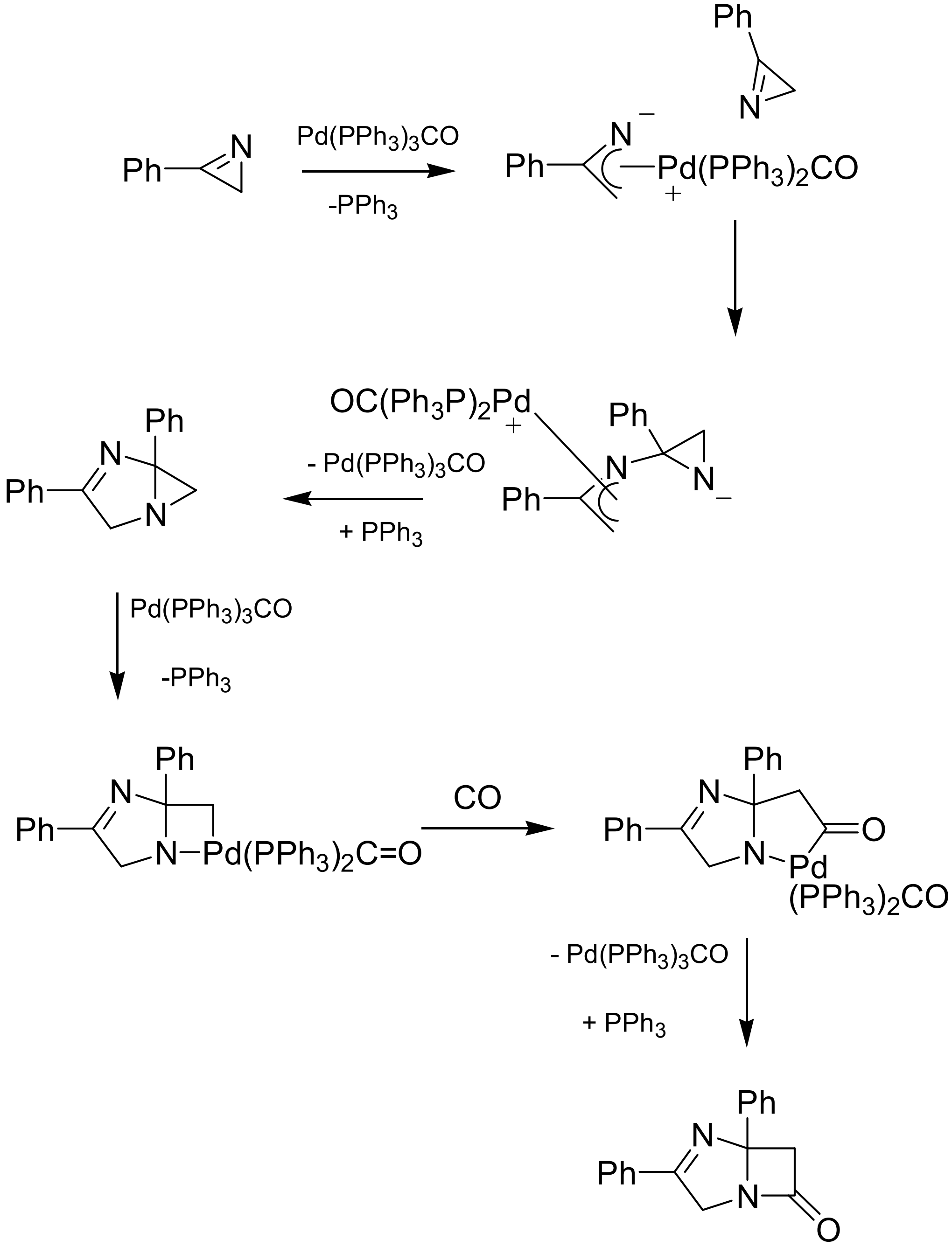
JOC 1991, **56**, 5147



predicted by ^{13}C NMR:
chemical shift
164 ppm not 200 ppm

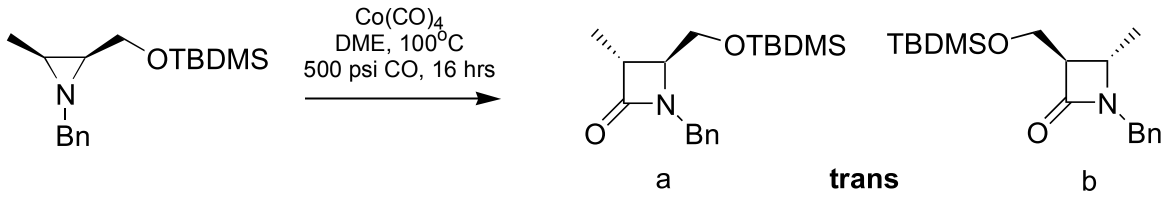
Meldrum’s acid as ketene source/Staudinger reaction

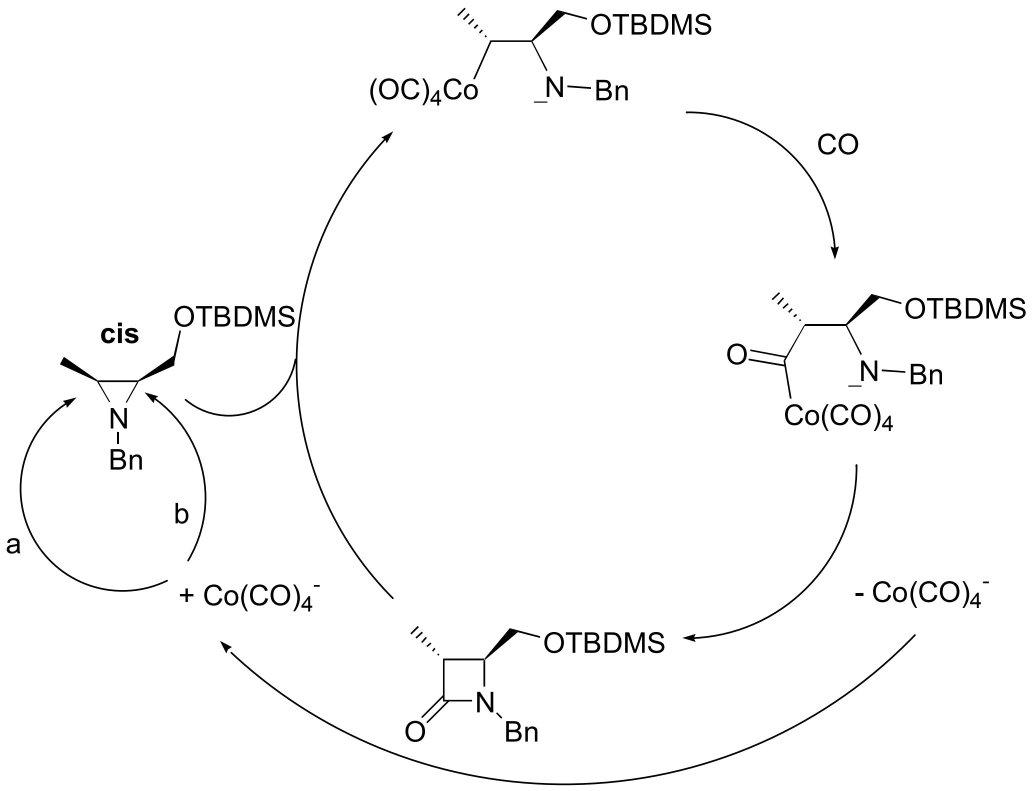
Org. Lett. 2000, **2**, 2065



key is carbonylation of heterocyle/azirine coordinates to Pd complex via metal insertion/second molecule of azirine reacts and leads to intramolecular cyclisation/the high ring strain allows for a second C-metal insertion leading to a four-membered metallacycle/CO insertion followed by coordination of CO replacement to Pd regenerates the catalytic palladium bistriphenylphosphine carbonyl complex.

JACS 1981, **103**, 1289





carbonylation of aziridines to beta-lactams. Cis and trans aziridines accessible via alpha,beta dibromoesters which are turned into aziridines through cyclisation using primary amines. Nucleophilic cobalt tetracarbonyl anion leads to ring opening and inversion of configuration/CO insertion/cyclisation/regeneration of transition-metal nucleophile. Cis aziridines give trans beta-lactams and vice versa/attack from aliphatic end preferred/corresponding aziridine esters are unreactive.

JOC 1999, **64**, 518