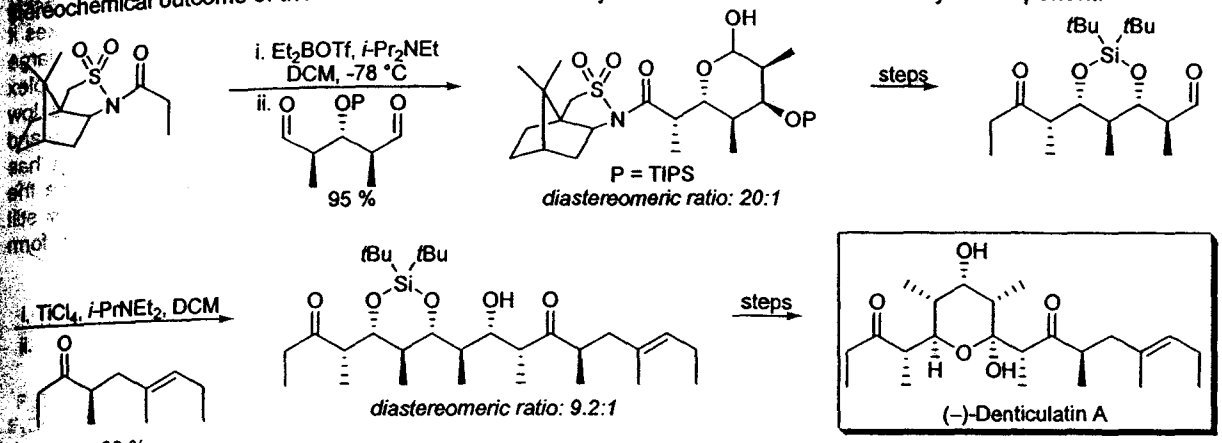
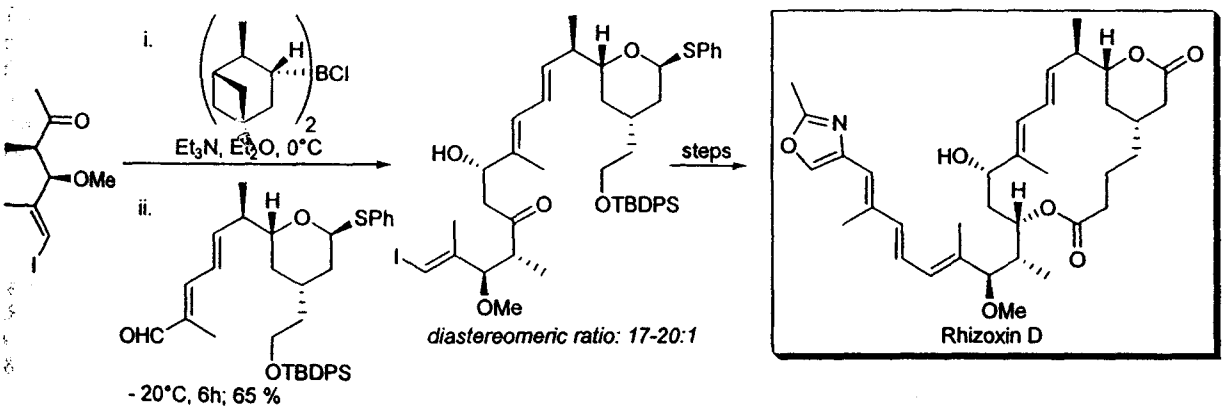
ALDOL REACTION

Synthetic Applications:

The first enantioselective total synthesis of (–)-denticulatin A was accomplished by W. Oppolzer.[83] The key step in their approach was based on enantiotopic group differentiation in a *meso* dialdehyde by an *aldol reaction*. In the *aldol reaction* they utilized a bornanesultam chiral auxiliary. The enolization of *N*-propionylbornane-10,2-sultam provided the (*Z*)-borylenolate derivative, which underwent an *aldol reaction* with the *meso* dialdehyde to afford the product with high yield and enantiopurity. In the final stages of the synthesis they utilized a second, *double-diastereodifferentiating aldol reaction*. Aldol reaction of the (*Z*)-titanium enolate gave the *anti*-Felkin *syn* product. The stereochemical outcome of the reaction was determined by the α-chiral center in the aldehyde component.



During the total synthesis of rhizoxin D by J.D. White et al., an *asymmetric aldol reaction* was utilized to achieve the coupling of two key fragments.[84] The *aldol reaction* of the aldehyde and the chiral enolate derived from (+)-chlorodiisopinocampheylborane afforded the product with a diastereomeric ratio of 17-20:1 at the C13 stereocenter. During their studies, White and co-workers also showed that the stereochemical induction of the chiral boron substituent and the stereocenters present in the enolate reinforce each other thus representing a *"matched" aldol reaction*.



A possible way to induce enantioselectivity in the *aldol reaction* is to employ a chiral catalyst. M. Shibasaki and co-workers developed a bifunctional catalyst, (*S*)-LLB (L=lanthanum; LB=lithium binaphthoxide), which could be successfully applied in direct *catalytic asymmetric aldol reactions*.[85] An improved version of this catalyst derived from (*S*)-LLB by the addition of water and KOH was utilized in the formal total synthesis of fostriecin.[86]