STEREOSELECTIVE SYNTHETIC STUDIES ON BIOLOGICALLY ACTIVE NATURAL SPIROKETALS

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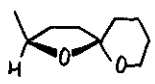
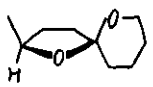
Spiro-ketal moiety plays a very important role as structural elements of many biologically active natural products. Although several construction methods for spiro-ketal skeleton have been developed, little is known concerning successful stereocontrol at the spiro carbon center.

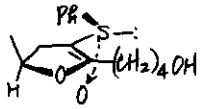
(*E*)- and (*Z*)-2-Methyl-1,6-dioxaspiro[4.5]decane (1-E and 1-Z), isolated as an insect pheromone of the common wasp, was efficiently synthesized in diastereoisomerically or optically pure form *via* a highly stereocontrolled intramolecular Michael addition of the hydroxyl group to unsaturated sulfoxide moiety of 2 and 3.



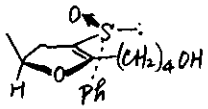
1-E



1-Z

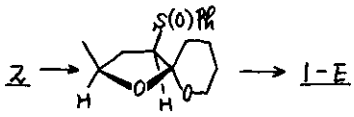


2

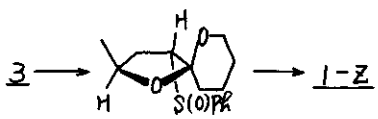


3

Acid-catalyzed or bromonium ion mediated cyclization of 2 and 3 gave diastereoisomeric mixtures of dioxaspiro products with somewhat stereoselectivity. On the other hand, the Michael-type cyclization of 2 and 3 by use of KH afforded each sole cyclized product, 4 and 5, respectively, which easily converted into 1-E and 1-Z in good yield. The excellent stereoselectivity in this reaction could be interpreted in terms of a stable chelation mediated by the potassium cation as shown in structure 6.



4



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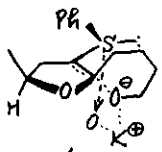

6