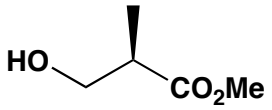
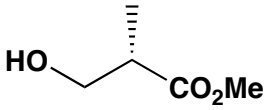
Massachusetts Institute of Technology
Organic Chemistry 5.512

April 20, 2005
Prof. Rick L. Danheiser

Problem Set 5
Stereocontrolled Addition to Carbonyl Compounds

Design a highly stereoselective synthesis of the following target molecules beginning with commercially available materials. Be sure to explicitly identify all reagents necessary for each transformation. Enantiomerically enriched reagents may be used if they are commercially available; however, with the exception of the two compounds shown below, each stereogenic center in the target molecule must be generated in your synthetic route. In other words, the stereogenic carbons in the chiral reagents you employ cannot be directly incorporated in the final product. The exceptions are (S) and (R) methyl 3-hydroxy-2-methylpropionate, which are commercially available and have been widely employed in total synthesis. A stereoselective synthesis of each of most of these target molecules has been reported in the literature and a reference for each synthesis will be provided with the solutions posted on the 5.512 Website.





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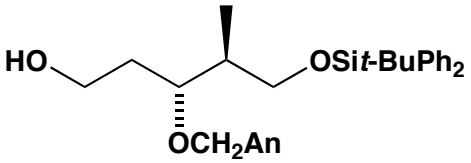
(1)



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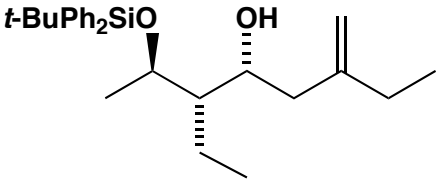

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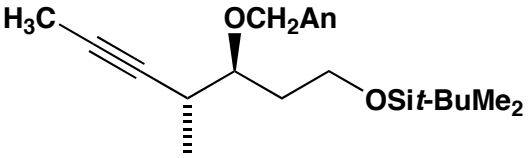

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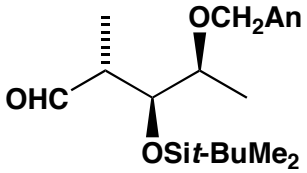
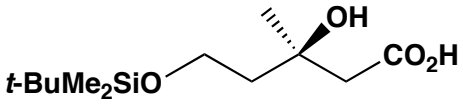
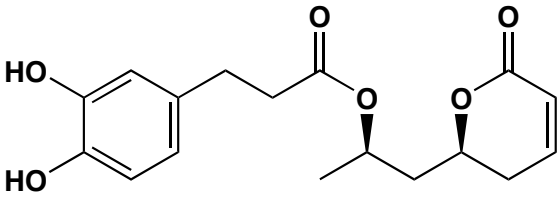

OCH2An
OHC
OSit-BuMe2

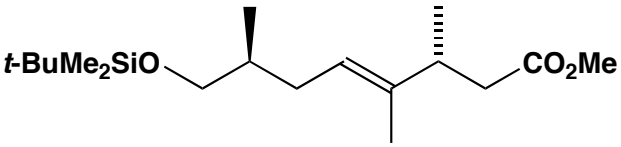
(5)


OH
CO2H
t-BuMe2SiO

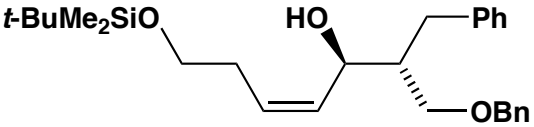
(6)


O
O
HO
O
O
HO

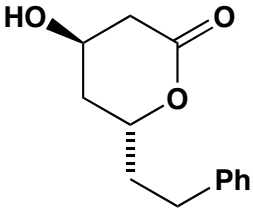
(7)


t-BuMe2SiO
CO2Me

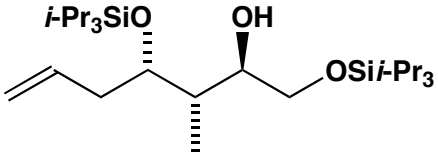
(8)


t-BuMe2SiO
HO
Ph
OBn

(9)


HO
O
O
Ph

(10)


i-Pr3SiO
OH
OSii-Pr3