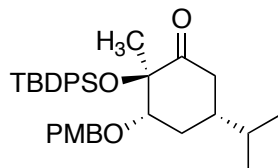
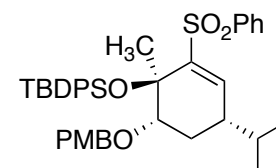


1.) PMBOH, $Ti(OPMB)_4$
2.) TBDPSCI, Imidazole



1.) PhSH, $TiCl_4$, Et_3N
2.) $NaBO_4 \cdot 4H_2O$, HOAc

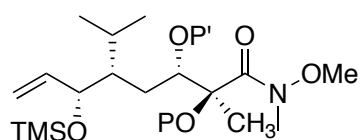


JACS **1998**, *120*, 8861
(2 steps, 87% from carvone)

Tet **1990**, *46*, 2593.
ACIE **2000**, *39*, 4082.

JOC, **2001**, *66*, 1949.
TL, **1994**, *35*, 1691.

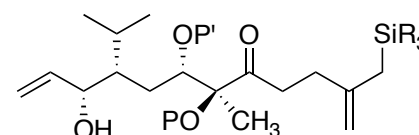
1.) O_3 , SMe_2 then $NH(OMe)Me$
2.) $MgCl$ then TMSCl



P = TBDPS, P' = PMB

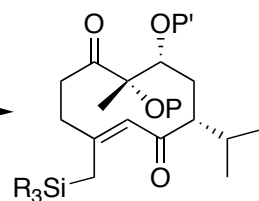
OL, **1999**, *1*, 355.
Liebigs, **1980**, *10*, 1477.
EJOC, **2003**, 3603.
BKCS, **2003**, *24*, 891.
CEJ, **2004**, *10*, 2237.

1.) CH_3Li
2.) LDA, TMS-protected alkene, I
then H_3O^+



CEJ, **2004**, *10*, 2237.
TL, **1983**, *24*, 1913.
Tet, **1988**, *44*, 3851.

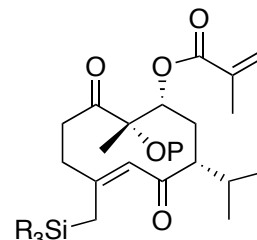
1.) PDC
2.) Grubbs II



JOC **1993** *58*, 1030.
OL, **2003**, *5*, 4891.
OL **2003**, *5*, 1693.

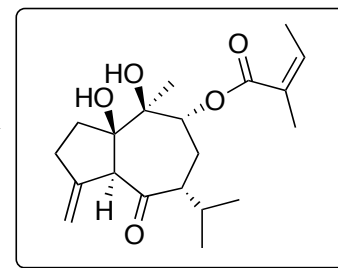
1.) DDQ
2.) $HO-C(=O)-CH=CH_2$

Yamaguchi Esterification



Tet, **1993**, *49*, 2701.
TL, **1991**, *32*, 5077.

Anhydrous TBAF



JOC, **1986**, *51*, 1932.
JOC, **1983**, *48*, 933.
JOC, **1952**, *17*, 1564.
JACS, **2005**, *127*, 2050.

Highlights:

Cheap Starting Material

Diastereoselective

Biomimetic

13 steps

No Chiral Reagents Used