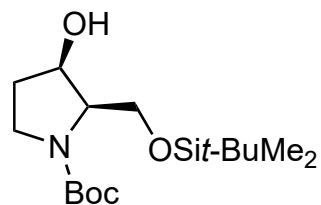


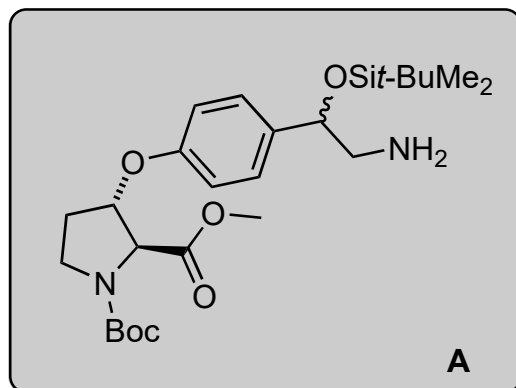
Total Synthesis of (-)-Nummularine F

Robert J. Heffner, Jianjun Jiang, and Madeleine M. Joullie

J. Am. Chem. Soc. **1992**, *114*, 26, 10181–10189



1-8



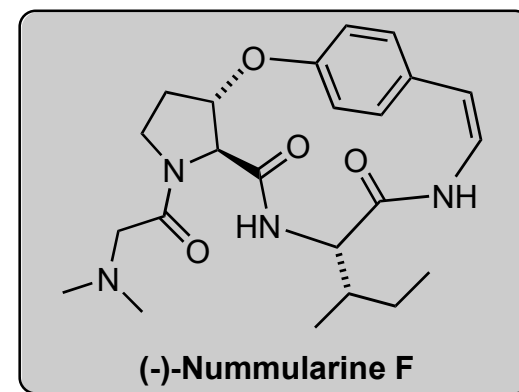
9-11

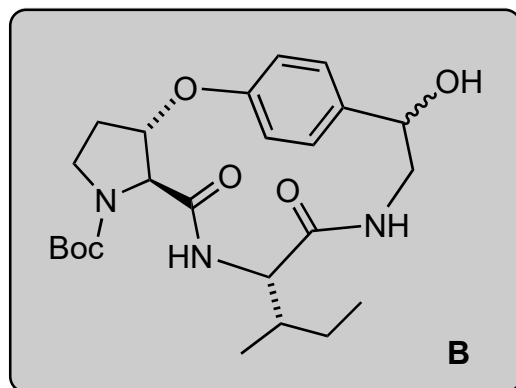
- 1) *p*-Cyanophenol, Ph₃P, DEAD, THF
- 2) HOAc:H₂O:THF
- 3) TFAA, DMSO, CH₂Cl₂, Et₃N, -78 °C
- 4) KMnO₄, NaH₂PO₄, *t*-BuOH, 5 °C
- 5) DCC, DMAP, MeOH, CH₂Cl₂
- 6) Raney Ni, NaH₂PO₂·H₂O, pyridine:HOAc:H₂O
- 7) MeNO₂, NaOMe, 0 °C then *t*-BuMe₂SiCl, DMF, imidazole
- 8) HCO₂NH₄, MeOH, 10% Pd/C

- 9) *Z*-L-Isoleucine, DCC, THF, HOBT,
- 10) LiOH/H₂O, MeOH then pentafluorophenol, DCC, CH₂Cl₂,
- 11) 10% Pd/C, cyclohexene, dioxane, 4-pyrrolidinopyridine then TBAF, THF

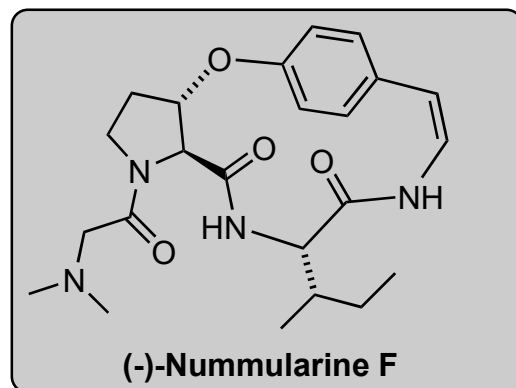
3) Name of the reaction:
Swern Oxidation

7) name of the reaction?
Henry Reaction





12-16



- 12) MsCl, NEt_3 , CH_2Cl_2 , $-5\text{ }^\circ\text{C}$
- 13) Diphenyl diselenide, NaBH_4 , ethanol
- 14) H_2O_2 , pyridine, CH_2Cl_2
- 15) Benzene, $60\text{ }^\circ\text{C}$
- 16) TFA then *N,N*-Dimethylglycine, DCC