Synthesis Challenge # 49

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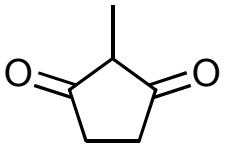
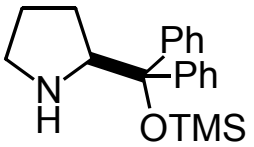


A

1-3

1) acrolein, H_2O, 12 h
2) **I** (10 mol %), $(BzO)_2$, hydroquinone, THF, H_2O,
c) 1-(triphenylphosphoranylidene)-2-propanone, toluene

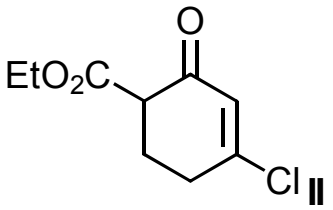


I

B

4-6

4) **II**, $Cu(OT)_2$ (50 mol %), CH_2Cl_2
5) *p*-TSA, CH_3CN, 55 °C
6) NaHMDS, toluene, −78 to 42 °C



II

C

7

7) DIBALH, THF, −78 to 60 °C, 12 h
then HCOOH, H_2O, 85 °C

D

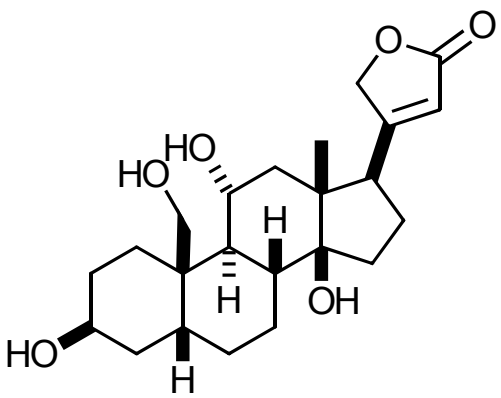
8-10

E

11-15

F

16-19



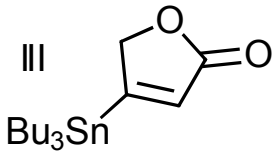
8) TIPSCl, ImH, DMF, rt, 6 h
9) DMP, Py, CH_2Cl_2, 2 h
10) H_2, Pd/C, MeOH, Py, 4 h

11) $LiAlH(OtBu)_3$, THF, −78 to −40 °C
12) TBSOTf, Et_3N, CH_2Cl_2, −78 to −30 °C
13) Li, NH_3, THF, −78 °C
14) TBAF, THF, −78 °C,
15) $N_2H_4 \cdot H_2O$, Et_3N, EtOH, 50 °C then I_2, Et_3N, THF, rt

16) **III**, $Pd(PPh_3)_4$, CuCl, LiCl, DMSO, 50 °C
17) TMSOTf, 2,6-lutidine, CH_2Cl_2, −78 °C to rt, 2h, then SiO2 (dry)
18) H_2, Pd/C, EtOAc, 30 min
19) HF in $CH_3CN/H_2O/CH_2Cl_2$

E was obtained as a mixture of diastereomers. Suggest methods for separation.

III



Step 18 delivers 2 diastereomers

Please provide a beautiful 3D drawing of the final product!