Total Synthesis of the Hexacyclic Sesterterpenoid Niduterpenoid B via Structural Reorganization Strategy

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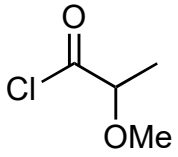

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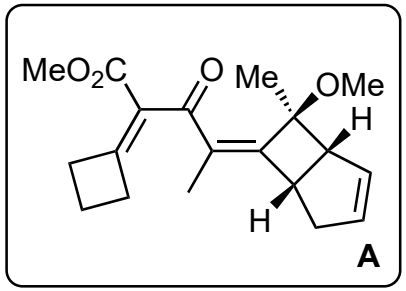

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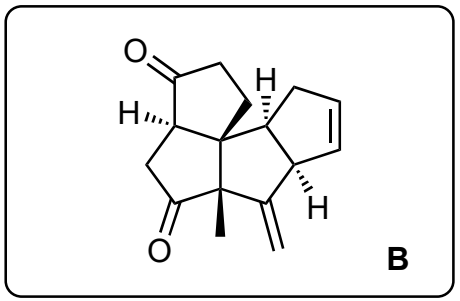
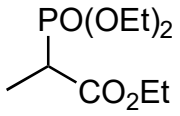


1) cyclopentadiene, Et_3N, 90 °C
2) NaH, **1**
3) LiOH
4) CDI *then* $MgCl_2$, $MeO_2CCH_2CO_2K$
5) $TiCl_4$, pyridine, **2**



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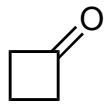


2

6) $B(C_6F_5)_3$, CSA, 4Å MS, 100 °C
7) LiCl, DMSO/H_2O, 185 °C
8) NaHMDS, TBSOTf
9) *m*-CPBA
10) K_2CO_3

1) Classify the reaction.
[2 + 2] cycloaddition

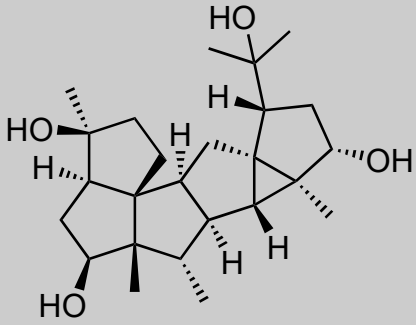
2) *Hint: Z-selective.* Name of the reaction?
HWE olefination

5) Name of the reaction?
Knoevenagel condensation

6) Suggest a mechanism. *Hint: 5/5/5/5 ring system generated, start with a 4π.*
(see later)

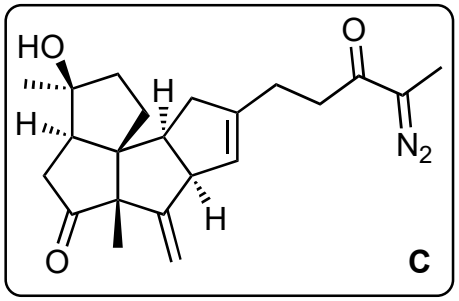
7) Name of the reaction?
Krapcho decarboxylation

10) *Hint: 1,4-diketone*



niduterpenoid B

11-15



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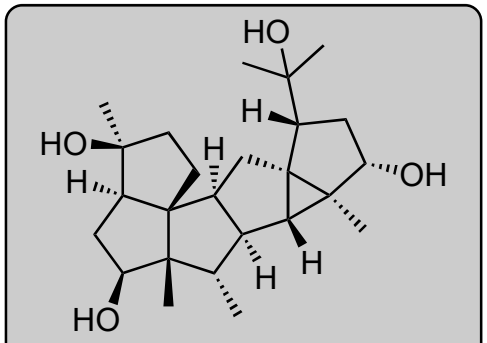

niduterpenoid B

11) MeLi
12) Et_3N, TIPSOTf *then* *m*-CPBA
13) Me_3SI, *n*-BuLi
14) $(EtO)_3CMe$, $EtCO_2H$, 145 °C *then* LiOH
15) $(COCl)_2$ *then* $MeCHN_2$

12) *Hint: bridged acetal*

14) Name of the reaction?
Johnson–Claisen rearrangement
15) *Hint: +TIPS deprotection*

16) $Rh_2(OAc)_4$ *then* TBSOTf, Et_3N
17) $Mn(dpm)_3$, TBHP, $Ph(i\text{-}PrO)SiH_2$ *then* HF•pyr
18) LiHMDS, PhSeCl *then* H_2O_2, pyridine
19) $CuBr•SMe_2$, isopropenylMgBr
20) $Mn(dmp)_3$, $PhSiH_3$, O_2 *then* $NaBH_4$

16) *Hint: bridged acetal... again*
(for diastereoselectivity in step 17)

20) Name of the reaction?
Mukaiyama hydration

Mechanism step 6: