Intramolecular Photocycloaddition-Cyclobutane Fragmentation: Total Synthesis of (±)-Silphinene

Michael T. Crimmins and S. Wayne Mascarella
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1) CH(OMe)₃, H₂SO₄
2) hv, NBS, (PhCO₂)₂, CCl₄, reflux
3) NaI

A

1) What is the pKa of the indicated H?

11

4) allyl alcohol, TsOH, p-cymene, reflux
5) PdCl₂, CuCl, O₂, DMF/H₂O
6) KOH 50 °C

B

5) What is the name of this reaction and mechanism?

Wacker Oxidation, see below
7) Bu$_3$PCuI, THF, \(\text{MgBr}\), then A, HMPA
8) 30% HClO$_4$, CH$_2$Cl$_2$
9) NaOMe, MeOH, 0°C
10) Me$_2$CuLi, Et$_2$O, 0°C
11) LiCl, DMSO/H$_2$O, 145 °C to rt
12) ETSA, Bu$_4$NF, THF
13) Saegusa Oxidation
14) hv, rt
15) TMSCl, NaI, MeCN, 80 °C
16) Bu$_3$SnH, PhH, 90 °C
17) LDA, (EtO)$_2$POCl, tBuOH/THF, -78 °C
18) Li, MeNH$_2$, 40 °C

12) Other alkyl amines tried gave inferior regioselectivity. Why might this combination lead to 96:4 isomer formation?
Authors declare this result surprising without much discussion. Cited paper briefly discusses asymmetric variations. JACS 1976, 98, 2346

13) What conditions would you use to perform this transformation?
Pd(OAc)$_2$, p-benzoquinone, MeCN

14) Justify the stereochemistry of the resulting product using Woodward Hoffman rules.

4π Photochemical cycloaddition, suprafacial-suprafacial, newly formed bonds are on the same face

18) 4.5:1 regioselectivity. Can be separated using AgNO$_3$ impregnated silica

Bonus Question: The authors suggest a similar strategy can be used for the synthesis of laurenene. How?