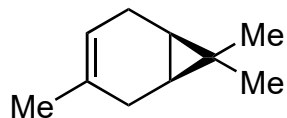


14 Step Synthesis of (+)-Ingenol

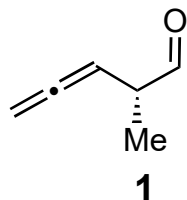
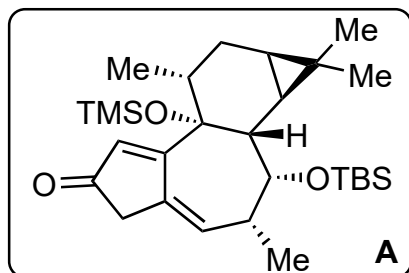
L. Jørgensen, S. J. McKerrall, C. A. Kuttruff, F. Ungeheuer, J. Felding, P. S. Baran, *Science*, 2013, 341, 878.



- 1) NCS, DMAP
- 2) O₃ thiourea
- 3) LiNap, HMPA, MeI *then* LiHMDS **1**
- 4) Ethynylmagnesiumbromide
- 5) TBSOTf (1 equiv) *then* TMSOTf (1 equiv)
- 6) [Rh(Cl(CO)₂)₂] CO

2) Name of the reaction? Why would you use thiourea? What other sulfur compound could you use? Please show the mechanism

Ozonolysis; Alternative: dimethylsulfide volatile and smelly, thiourea nonvolatile nonsmelly; mech below



6) Name of the Reaction?

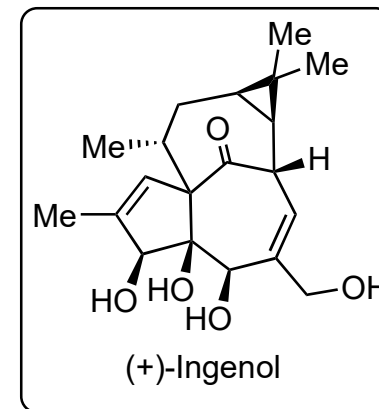
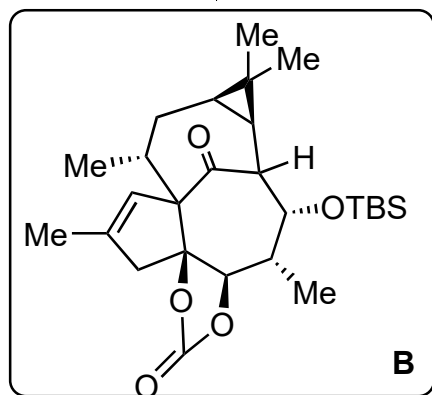
Pauson Khand

<https://doi.org/10.1021/ol025955w>

- 7) MeMgBr
- 8) OsO₄
- 9) CDI
- 10) BF₃•OEt₂

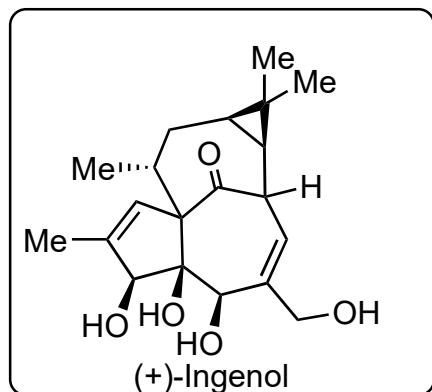
10) Name of the reaction?

vinyllogous pinacol rearrangement



- 11) SeO_2 then Ac_2O
- 12) HF
- 13) Martin's Sulfurane then NaOH
- 14) SeO_2 , HCO_2H

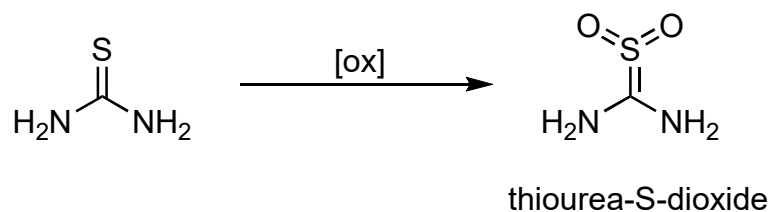
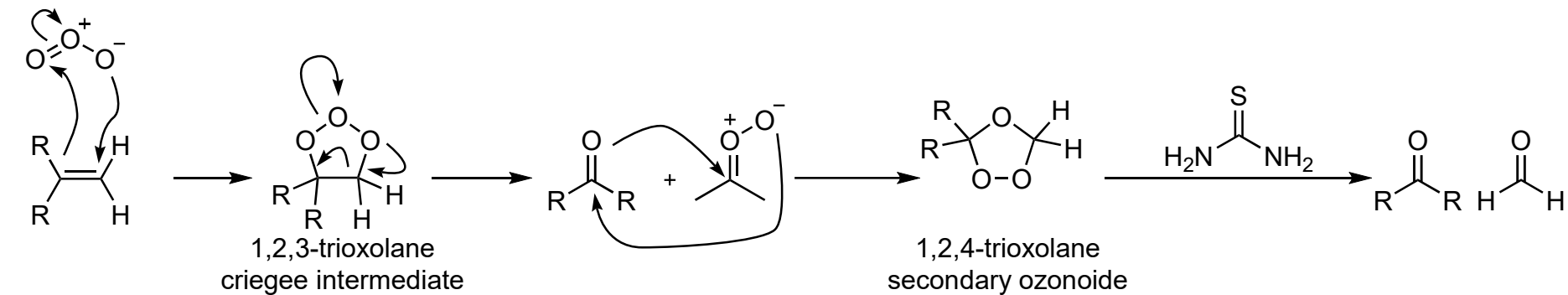
14) Name of the reaction? Please provide a mechanism
Riley oxidation



Ozonolysis:

Thiourea: [https://doi.org/10.1016/0040-4020\(82\)80187-7](https://doi.org/10.1016/0040-4020(82)80187-7)

Criegee mech: <https://www.organic-chemistry.org/namedreactions/ozonolysis-criegee-mechanism.shtm>



Riley oxidation:

