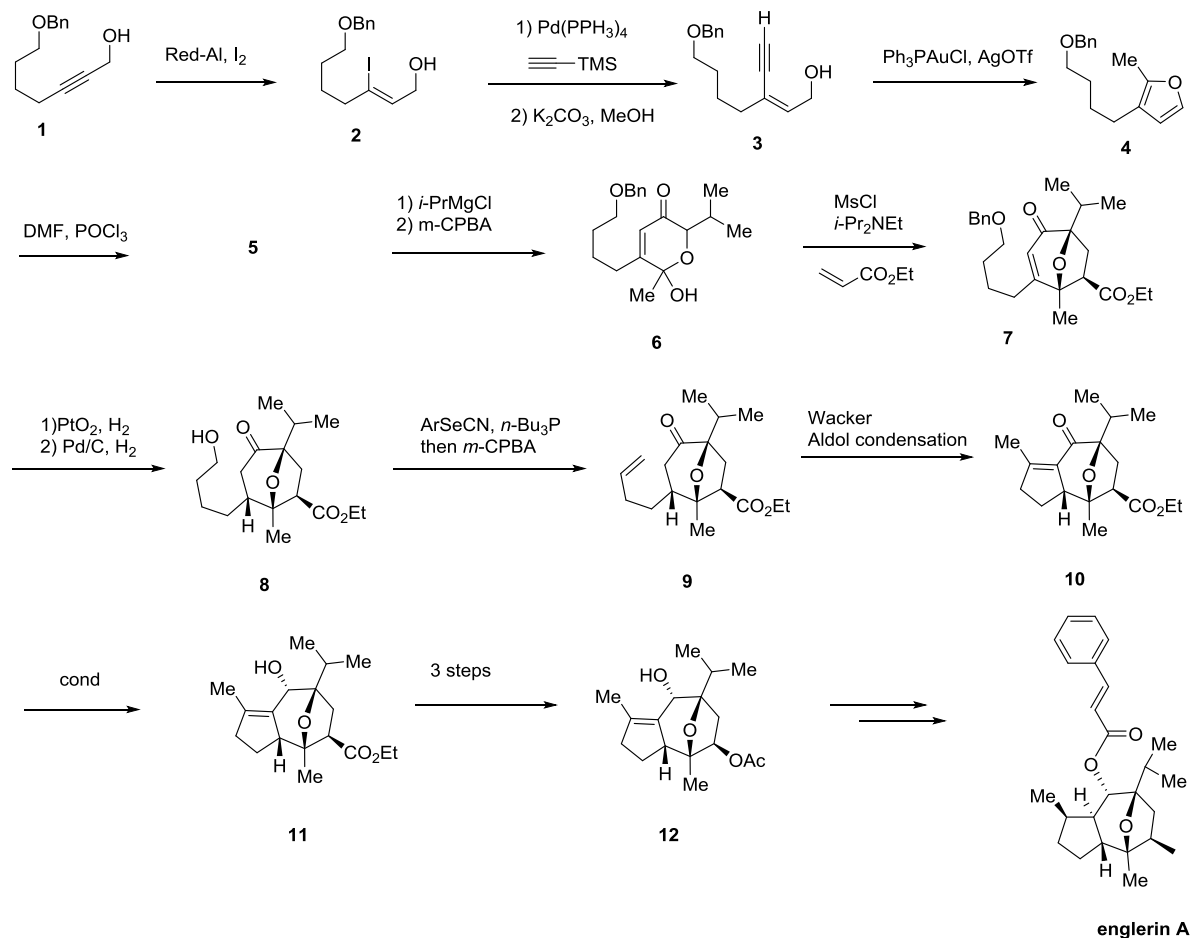


Total Synthesis of Englerin A

Problem:



Master students :

-What is the name and the mechanism of the formation of **5** from **4**? Give structure of **5**

For the others :

-Explain the formation of **4** from **3**. Which product do you expect for a tertiary alcohol?

Give a famous way to prepare Furans in general.

-Explain the formation of **7** from **6** (draw proper intermediate) Which kind of reaction is it?

-Explain the Wacker oxidation

-Conditions and name to obtain **11**. Explain the selectivity-Find reagents to obtain **12** (could theoretically be achieved in 2 steps)

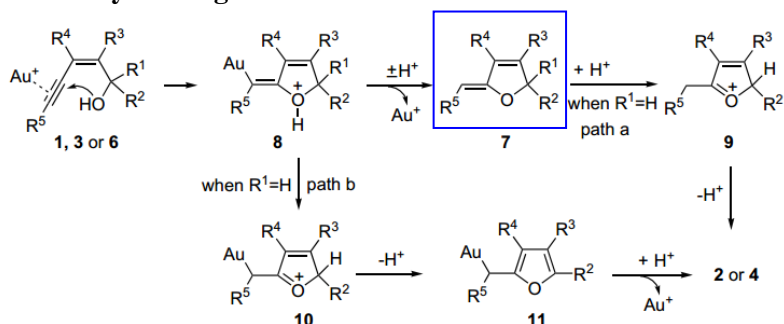
Keywords : Gold-catalyzed ring closure, [5+2] cycloaddition, Wacker, Luche

Ref: K.C. Nicolaou, Qiang Kang, Sin Yee and David Y.-K Chen, *J. Am. Chem. Soc.* **2010**, *132*, 8219–8222

DOI: 10.1021/ja102927n

For masters : Vilsmeier-Haack Formylation

Gold-catalyzed ring closure



For tertiary , they obtained dihydrofuran (in blue)

-Coordination of the triple bond of enynol to PPh₃AuOTf enhances the electrophilicity of alkyne

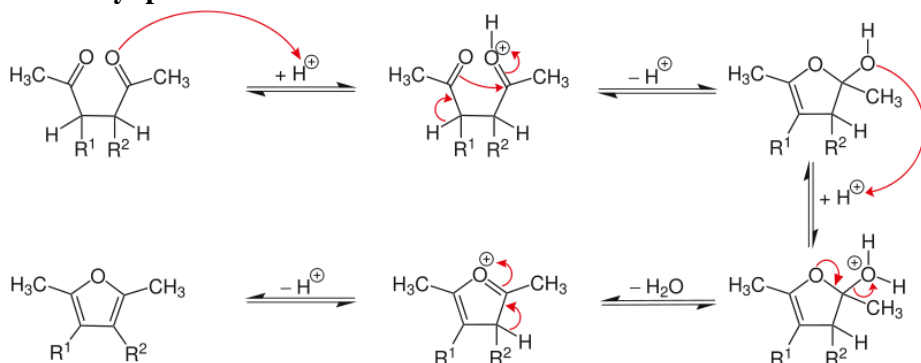
-Subsequent anti-5-exo-dig nucleophilic attack of the hydroxyl group on a Au(I)-alkyne complex to form complex 8

-Protonolysis of 8 affords dihydrofuran 7 and regenerate Au⁺.

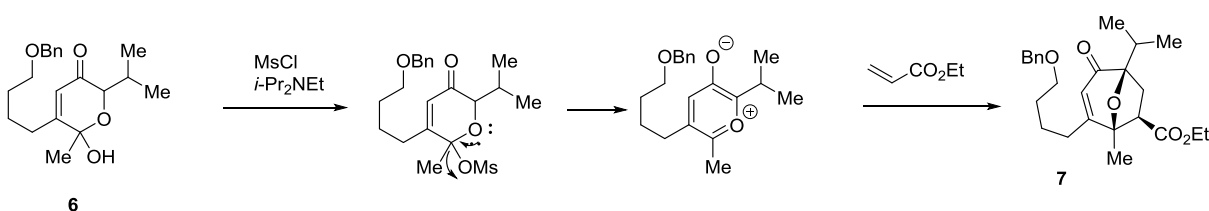
-Furans 2 or 4 formed either by isomerization of 7 (path a) or isomerization/protonolysis pathway (path b)

-> oxyauration from (Z)-enynols highly stereoselective.

other way: paal knorr



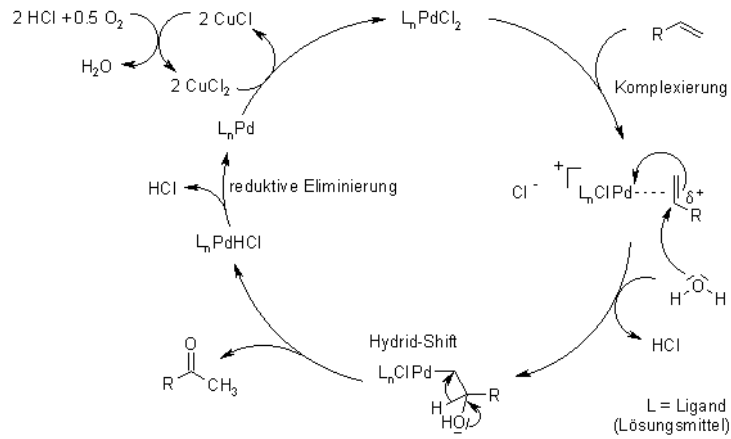
[5+2] cycloaddition



generation of oxopyrilium

Major P : exo

Wacker oxidation



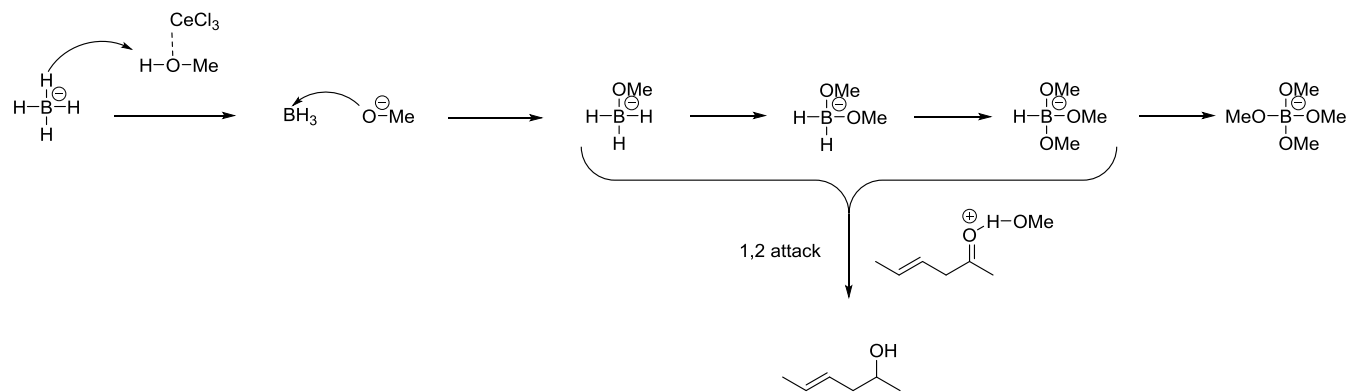
nach: J. Tsuji, "Palladium Reagents and Catalysts", First Edition 2004, Wiley, 29-35.

Luche conditions

Selective 1,2-reduction of enones with sodium borohydride achieved in combination with CeCl₃.

1,2-reduction with higher selectivity : CeCl₃ is a selective Lewis acid catalyst for the methanolysis of sodium borohydride. The resulting reagents (various sodium methoxyborohydrides) are harder reducing agents (according to HSAB principles).

Attack hydride from top face in the bridge because small hydride



Formation of 12

