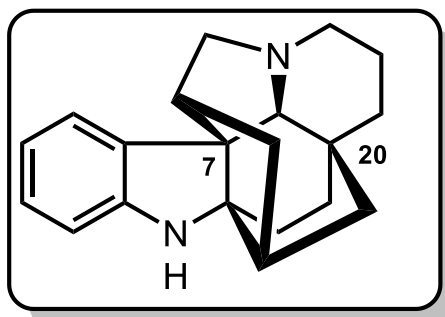
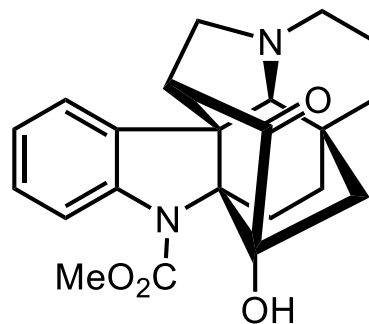


Natural Products Synthesis

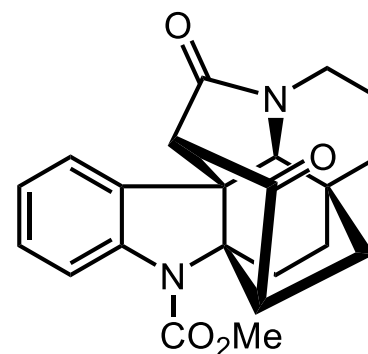
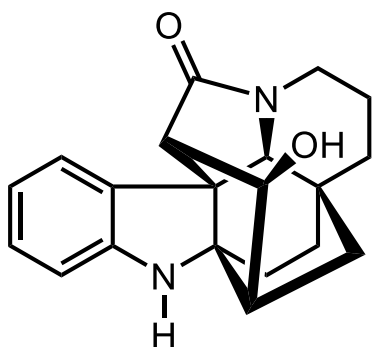
How to cite:

International Edition: doi.org/10.1002/anie.202201712

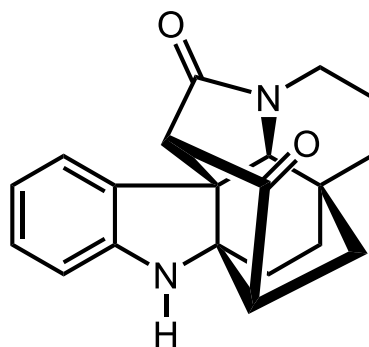
German Edition: doi.org/10.1002/ange.202201712

Divergent Total Synthesis of Four Kopsane Alkaloids: *N*-Carbomethoxy-10,22-dioxokopsane, Epikopsanol-10-lactam, 10,22-Dioxokopsane, and *N*-Methylkopsanone*Bo Qin, Zhepei Lu, and Yanxing Jia**skeleton of
kopsane-type alkaloids

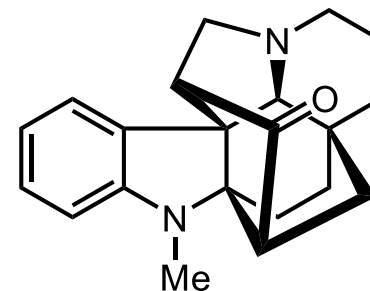
kopsine (1)

*N*-carbomethoxy-
10,22-dioxokopsane (2)

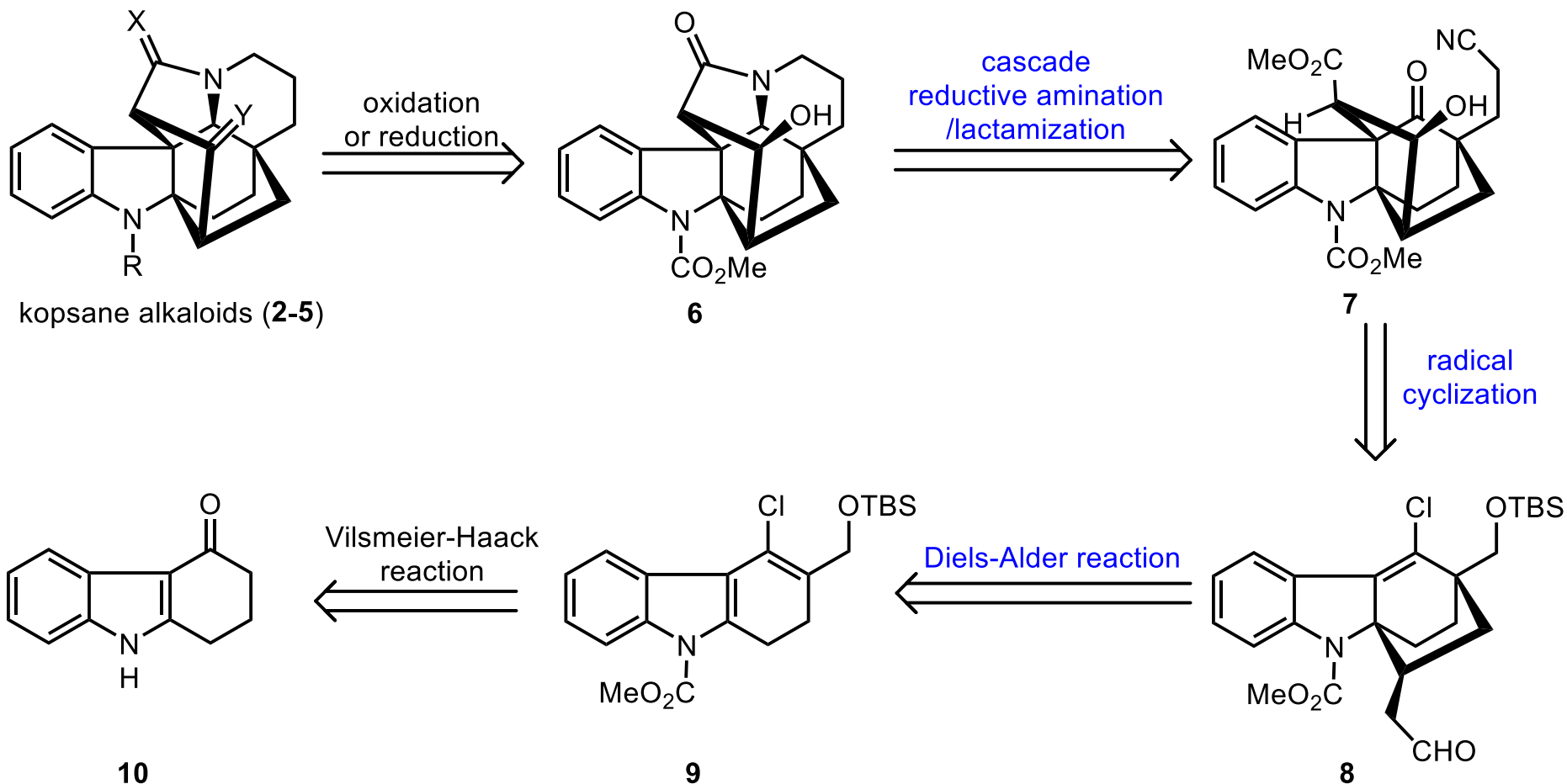
epikopsanol-10-lactam (3)



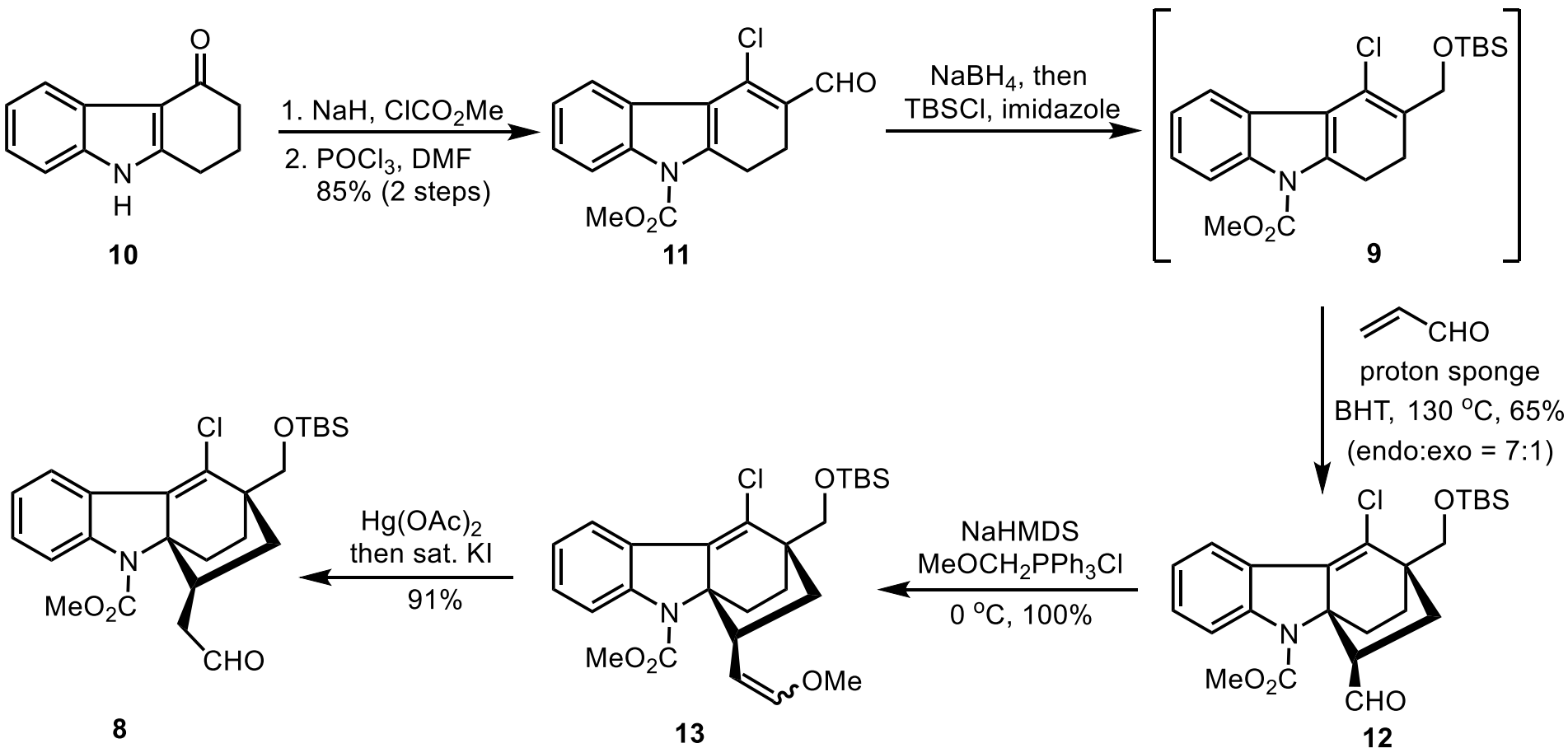
10,22-dioxokopsane (4)

*N*-methylkopsane (5)

Retrosynthetic analysis



Synthesis of aldehyde 8

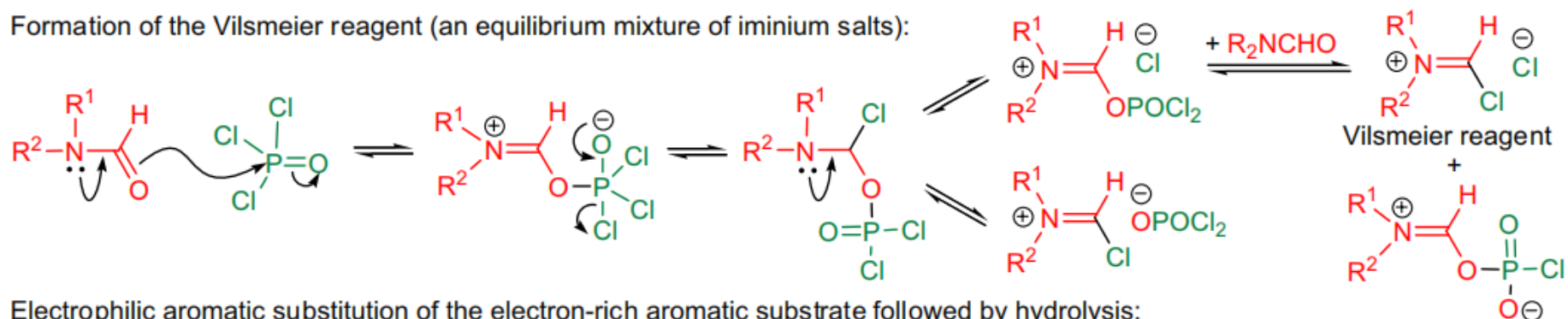


VILSMEIER-HAACK FORMYLATION

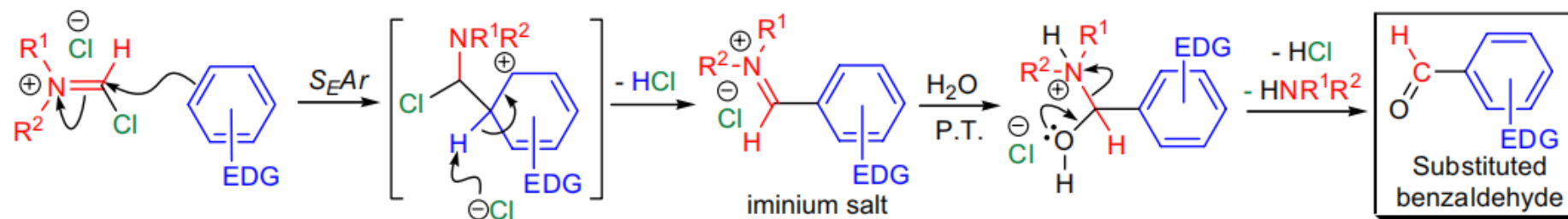
(References are on page 699)

Mechanism: ^{34-41,8,42,11}

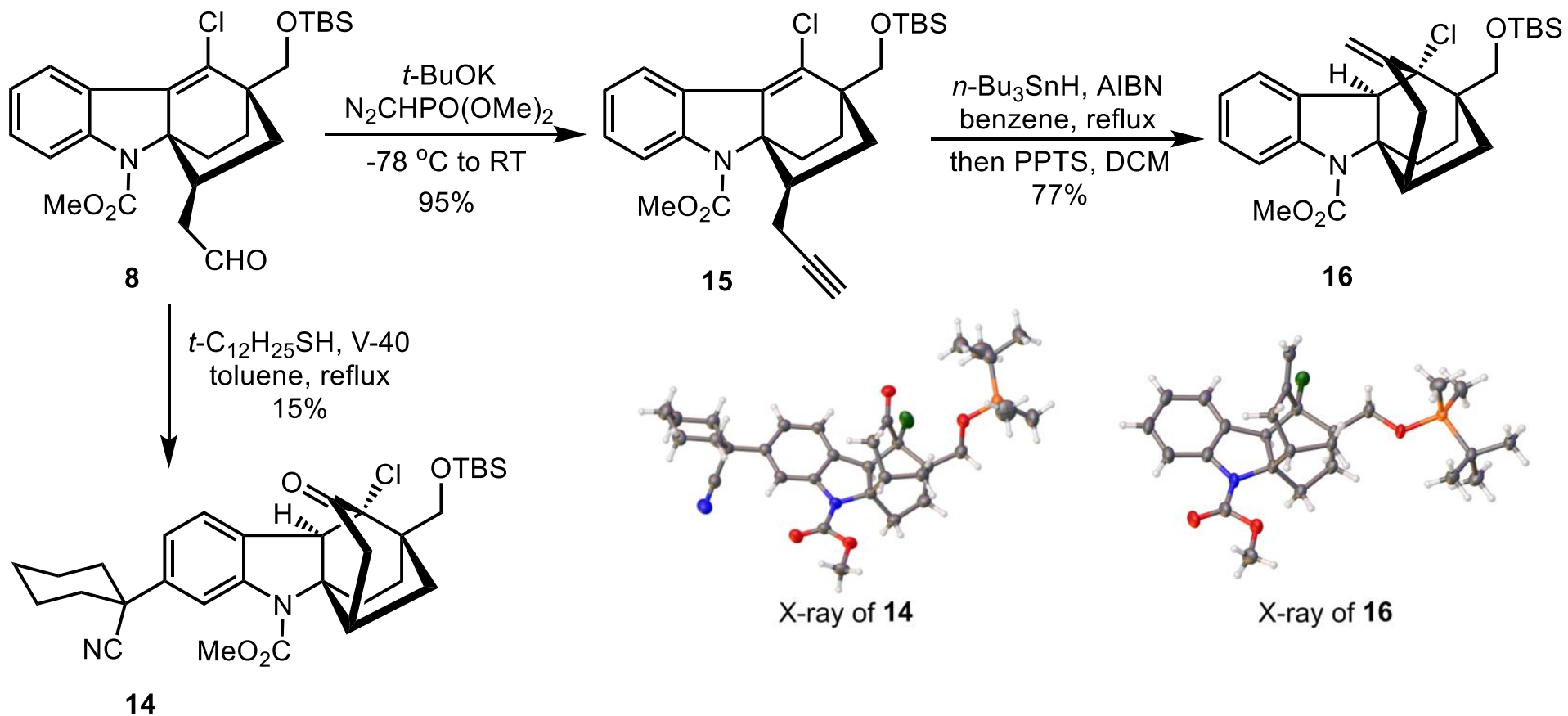
Formation of the Vilsmeier reagent (an equilibrium mixture of iminium salts):



Electrophilic aromatic substitution of the electron-rich aromatic substrate followed by hydrolysis:

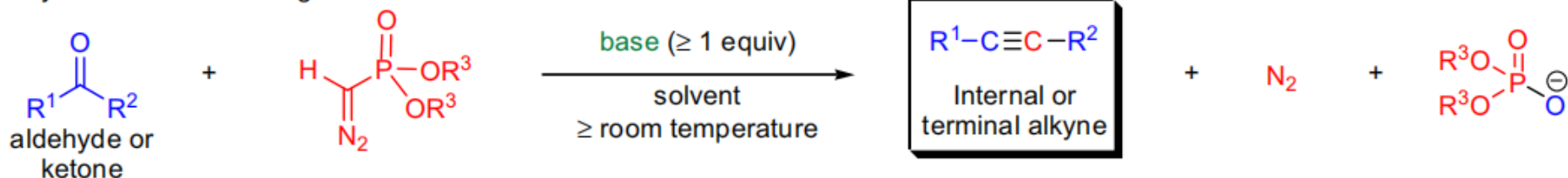


Radical cyclization of **8** and **15**

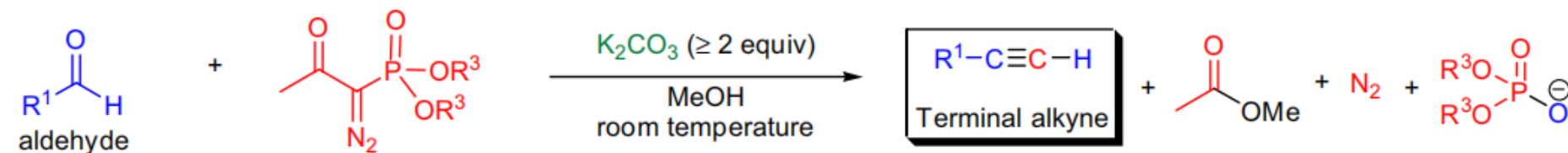


SEYFERTH-GILBERT HOMOLOGATION

Seyferth-Gilbert homologation:

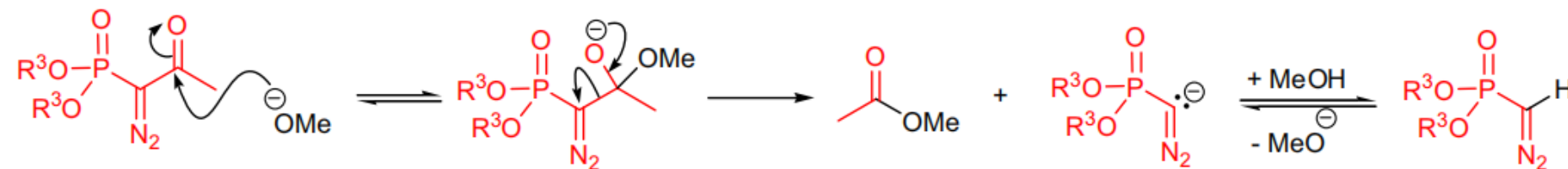


Modification for the synthesis of terminal alkynes (Ohira & Bestmann):

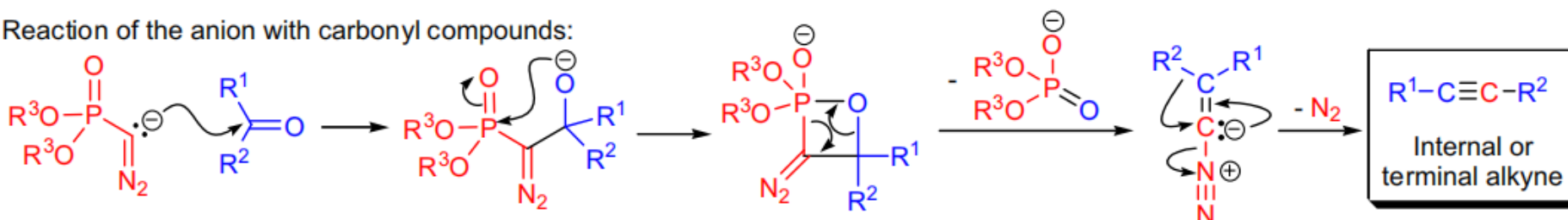


R^1 = alkyl, aryl, heteroaryl; R^2 = H, aryl, heteroaryl; R^3 = Me, Et; base: *n*-BuLi, KO-*t*Bu

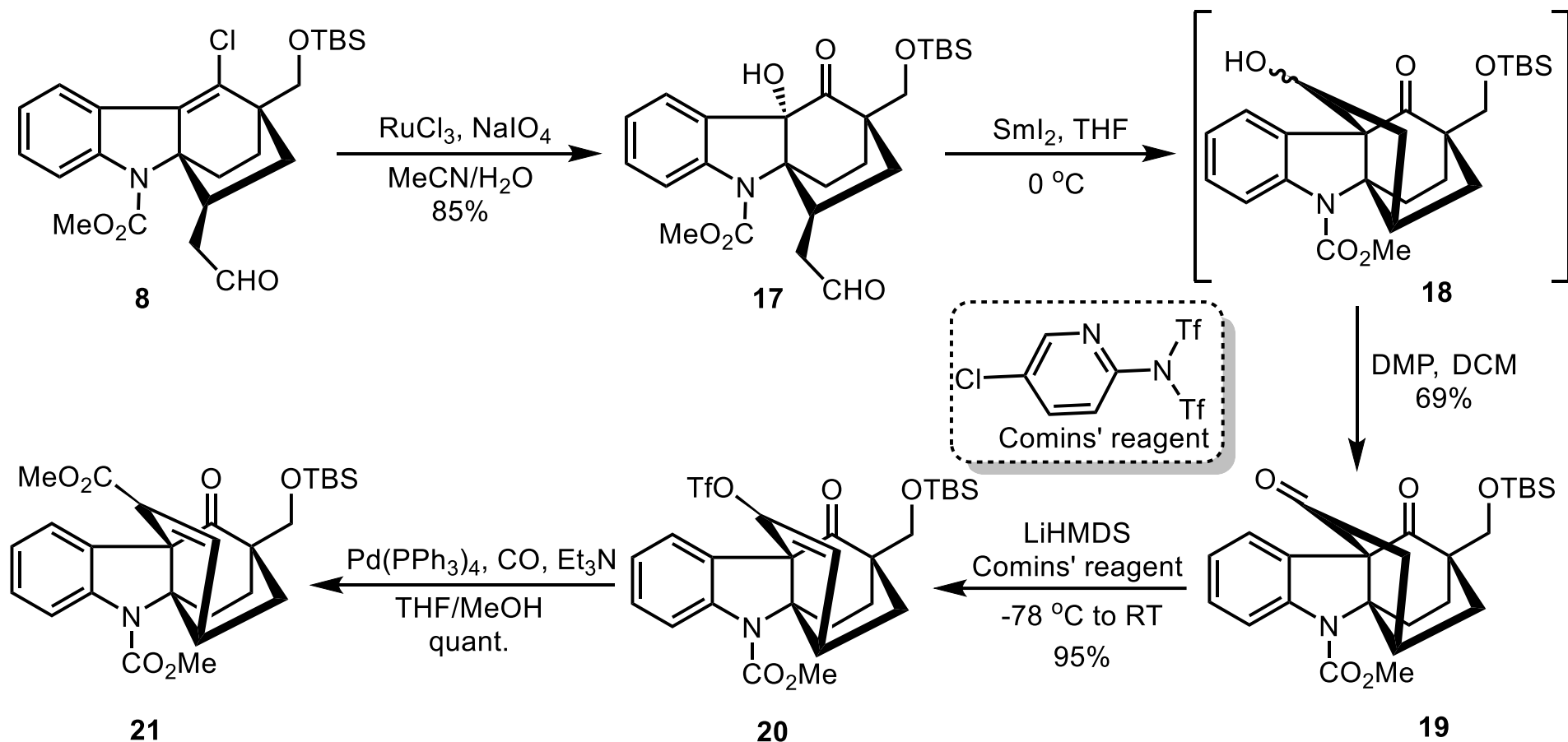
Formation of the dialkylphosphonodiazomethane from dialkyl-1-diazo-2-oxopropylphosphonate:

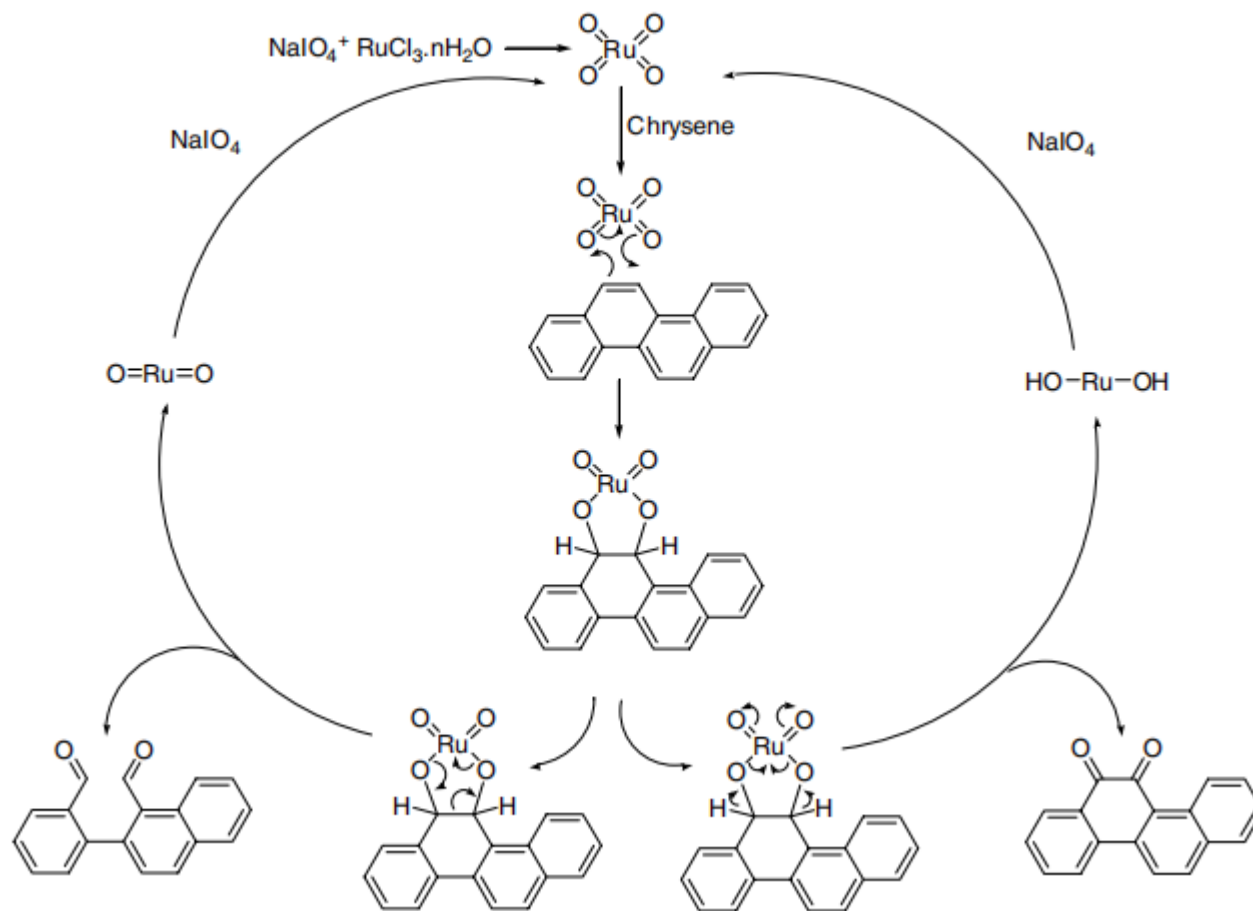


Reaction of the anion with carbonyl compounds:



Preparation of the common intermediate 6

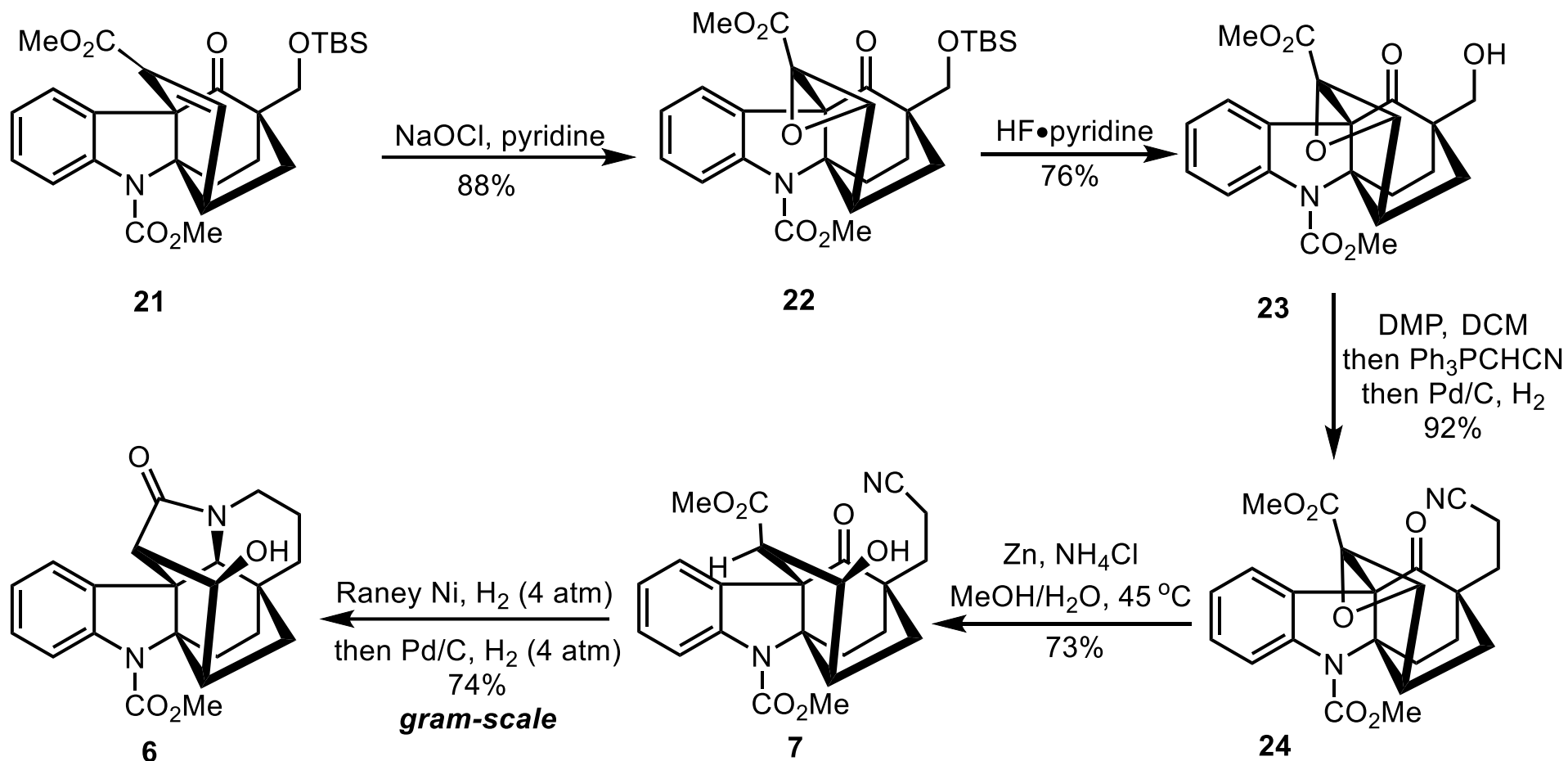




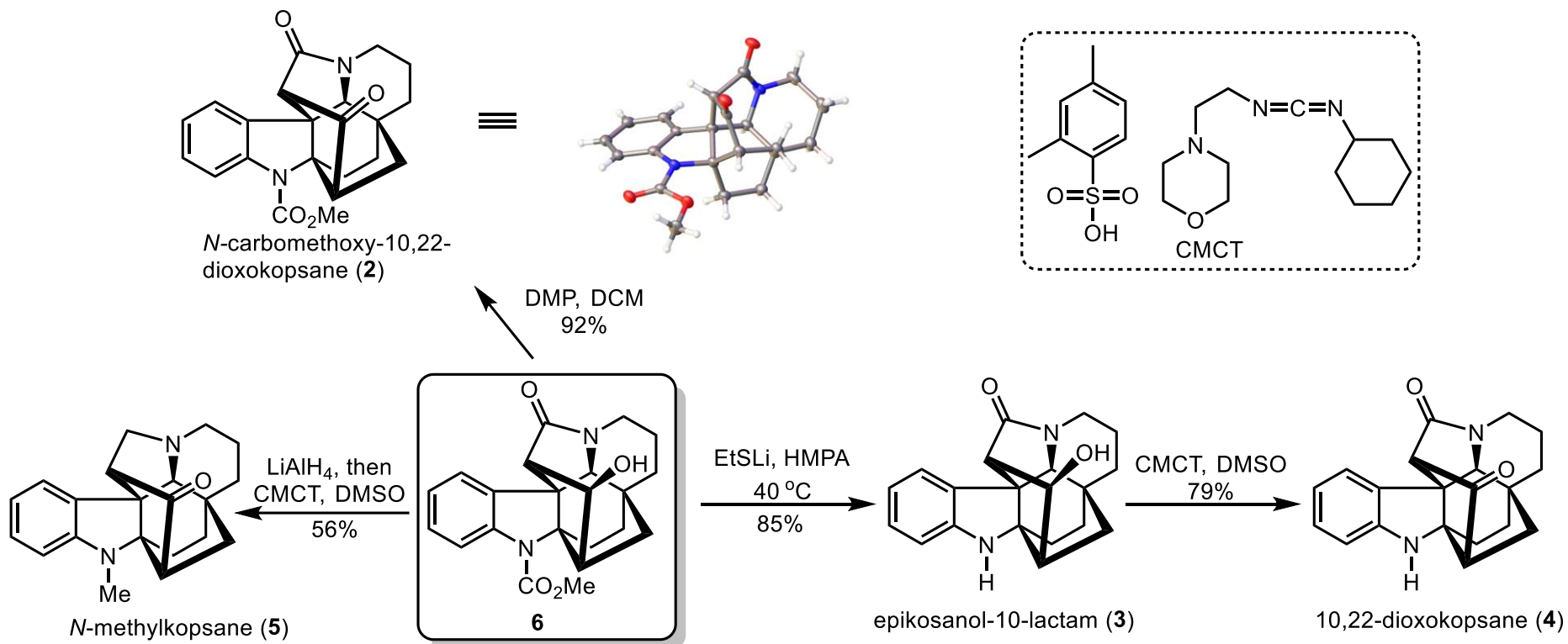
DOI:10.1016/j.catcom.2007.07.024.



Preparation of the common intermediate 6



Divergent total synthesis of 2-5



Asymmetric synthesis of aldehyde 12

