

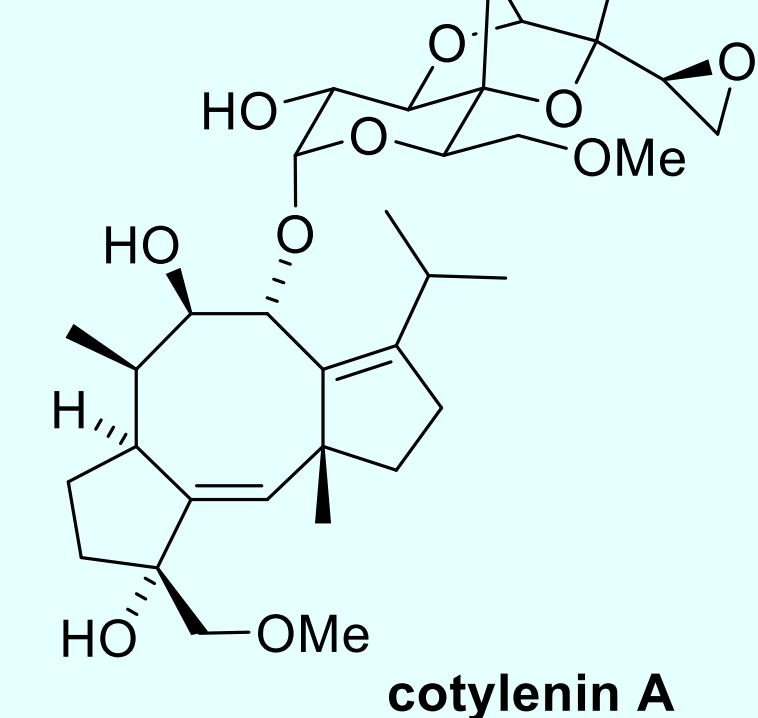
# 有用な生物機能多環式中分子の高効率合成

(早大院理工) 中田雅久



## Enantioselective Total Synthesis of Cotylenin A

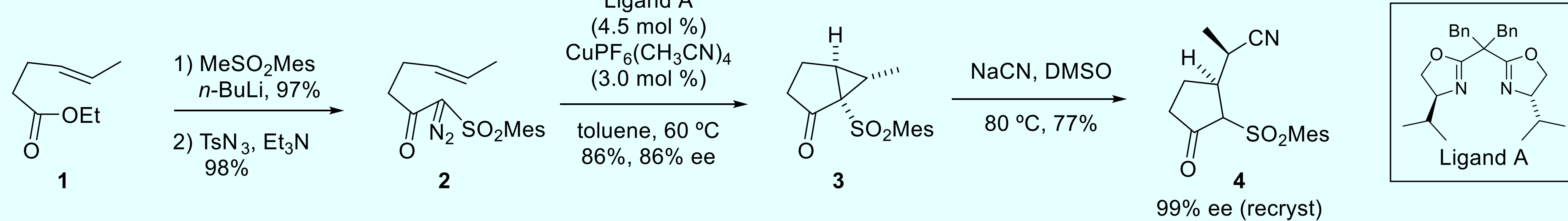
Uwamori, M.; Osada, R.; Sugiyama, R.; Nagatani, K.; Nakada, M.  
*J. Am. Chem. Soc.* **2020**, *142*, 5556–5561.



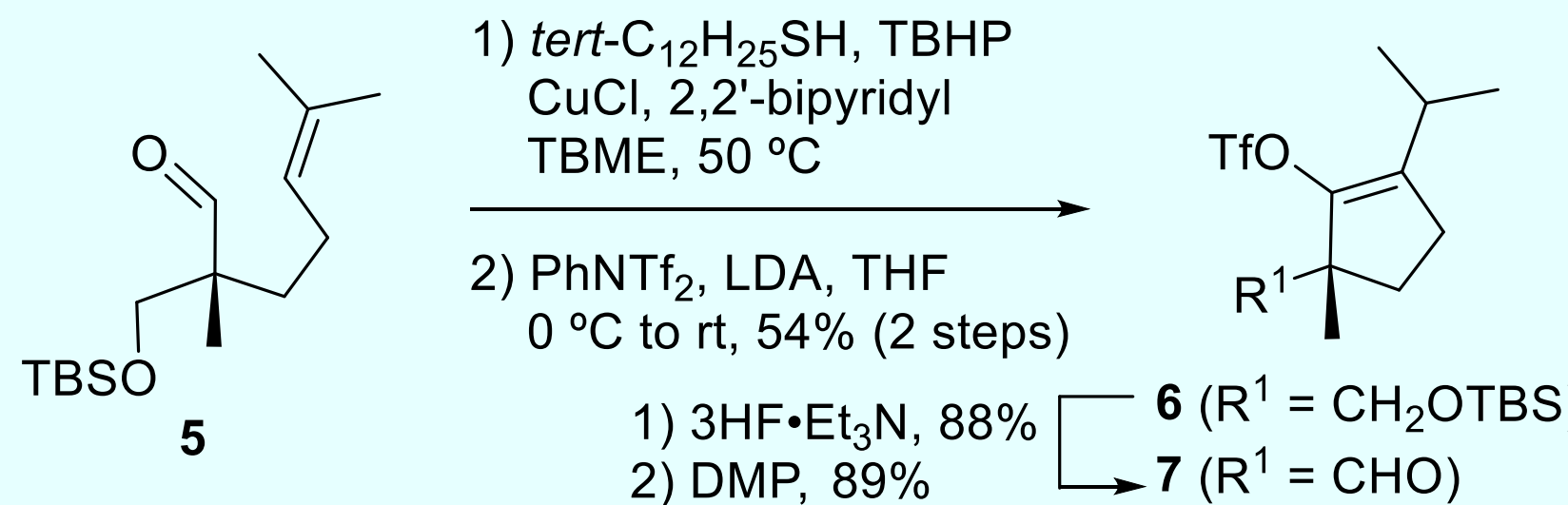
**Isolation**  
 • from *Cladosporium* sp. as a plant growth regulator.  
**Biological Activities**  
 • Induces the apoptosis of human cancer cell lines by combined treatment with interferon- $\alpha$ .  
 • Stabilizes the interactions of 14-3-3 proteins.  
**Structural Features**  
 • 5-8-5 Tricyclic ring system (ABC ring)  
 • Highly oxygenated sugar part  
 • Chiral centers with quaternary stereogenic center

Figure 1. Structure and profile of cotylenin A.

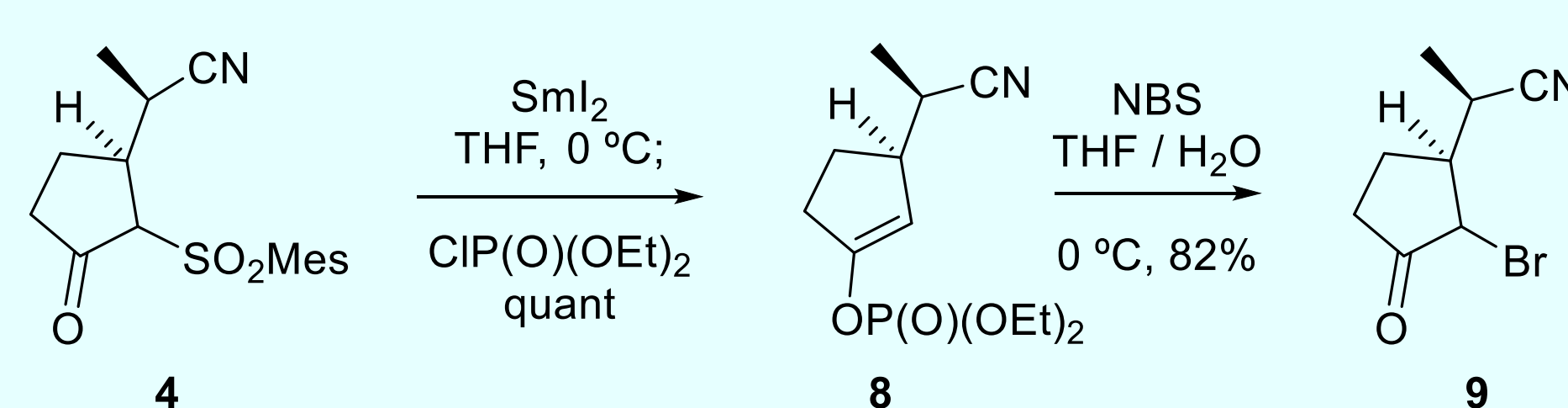
## Scheme 1. CAIMCP of 2 and Preparation of 4



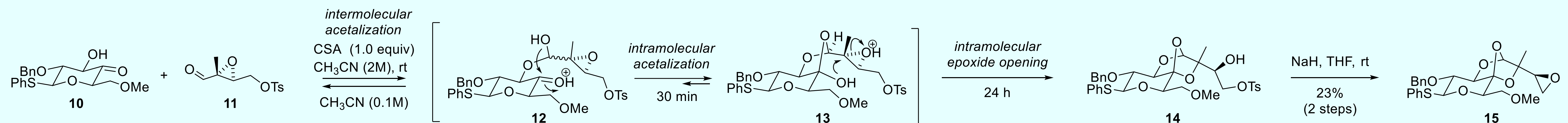
## Scheme 2. Preparation of 7 via Acyl Radical Cyclization



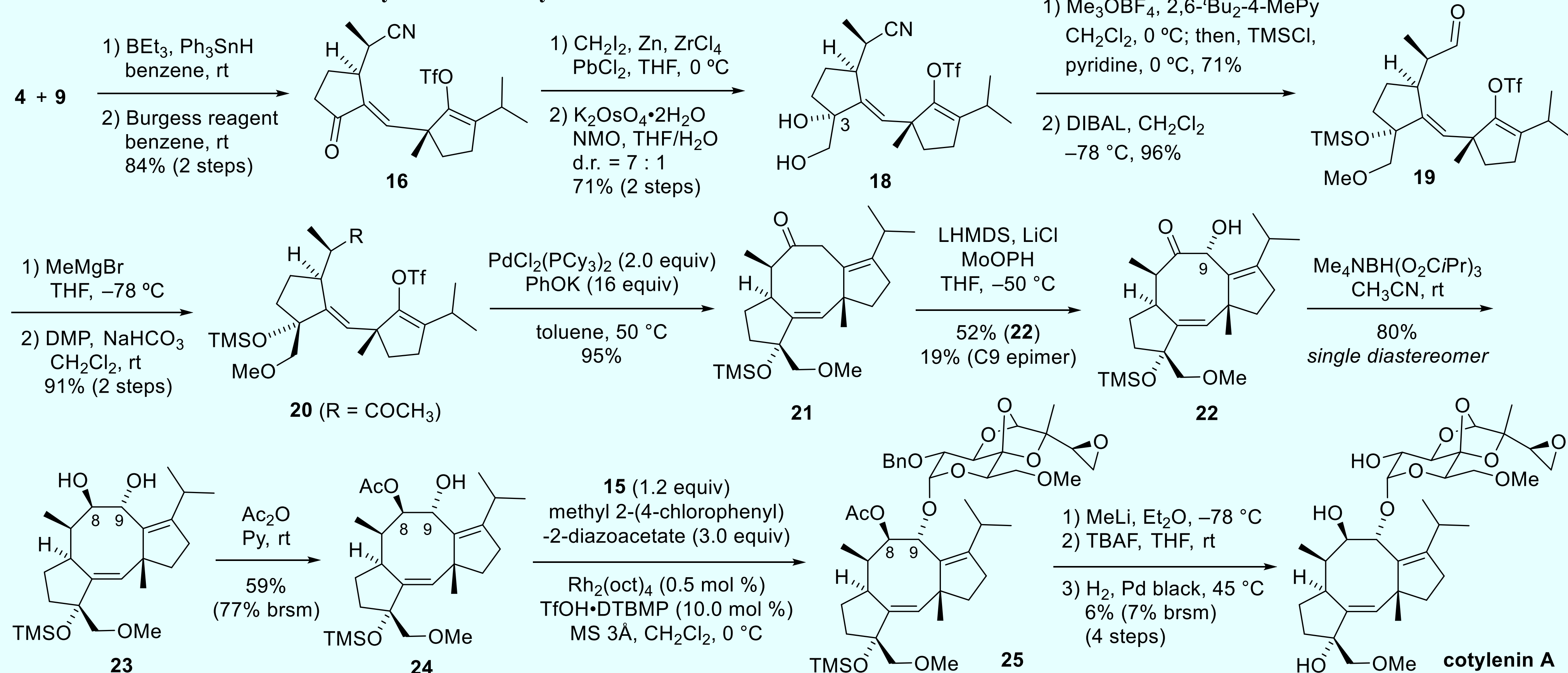
## Scheme 3. Preparation of 9



## Scheme 4. Preparation of 15 via Acetalizations and Epoxide-Opening Cascade



## Scheme 5. Enantioselective Total Synthesis of Cotylenin A



市販化合物からコチレニンAを全合成  
 早大の研究チームが世界初の成功  
 強力な新規抗ガン剤候補発見期待

日本化学会第99春季年会のハイライト講演に選出  
 科学新聞ほか、インターネットで朝日新聞、毎日新聞、日経新聞など26社により報道

## An Enantio- and Stereoselective Construction of Atisane Scaffold via Organocatalytic Intramolecular Michael Reaction and Diels-Alder Reaction

Sekita, H.; Adachi, K.; Kobayashi, I.; Sato, Y.; Nakada, M.  
*Org. Lett.* **2017**, *19*, 2390-2392.

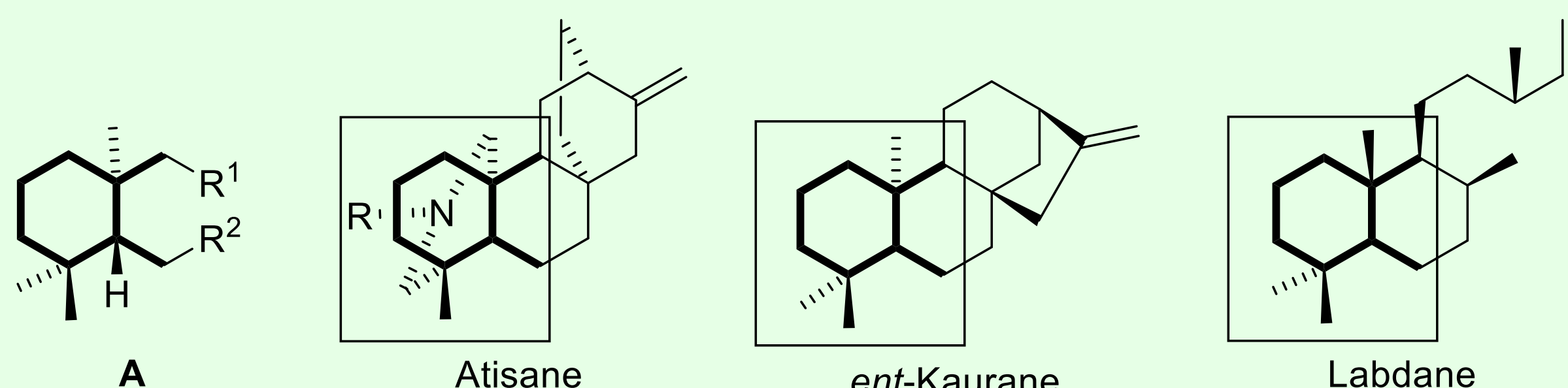
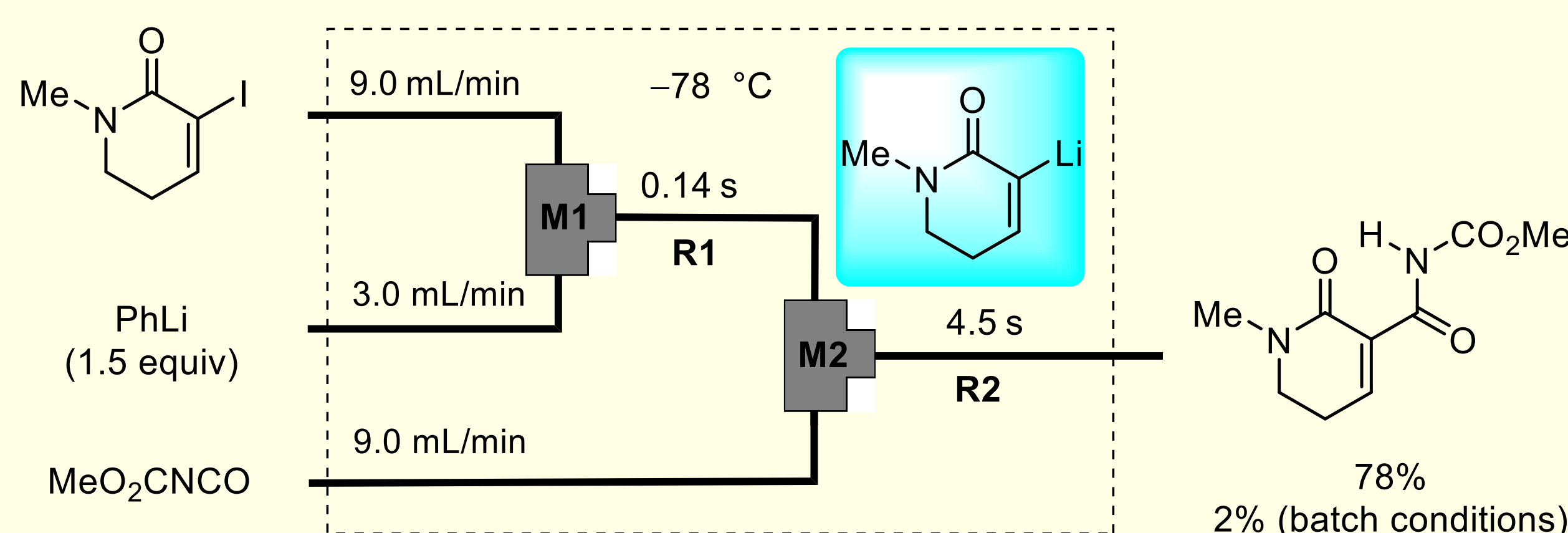


Figure 2. Structures of A and terpenoids involving A.

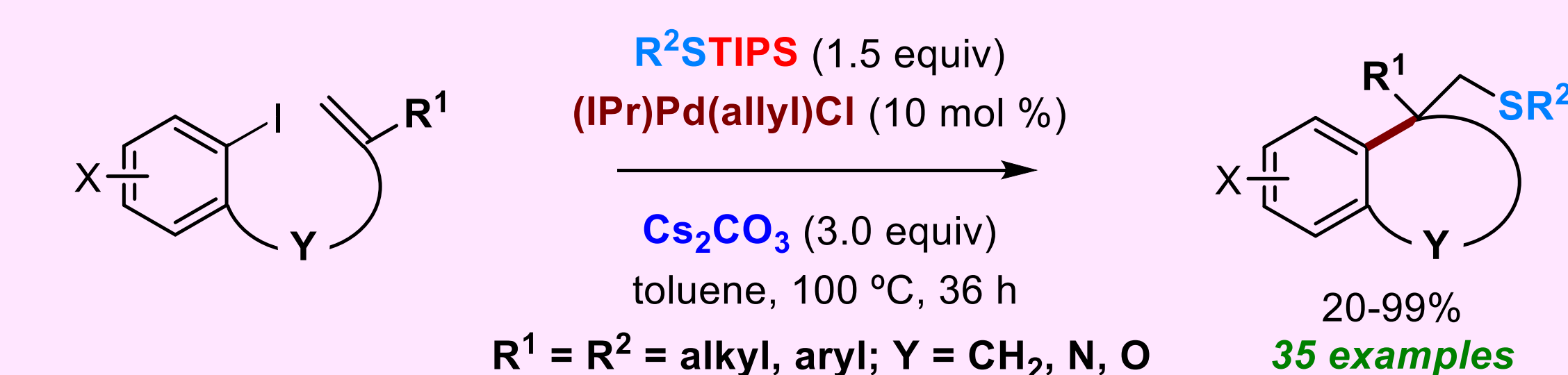
## Efficient Preparation of Cyclic $\alpha$ -Alkylidene $\beta$ -Oxo Imides Using a Flow Microreactor System

Komuro, K.; Nagaki, A.; Shimoda, H.; Uwamori, M.; Yoshida, J.-i.; Nakada, M.  
*Synlett* **2018**, *29*, 1989-1994.



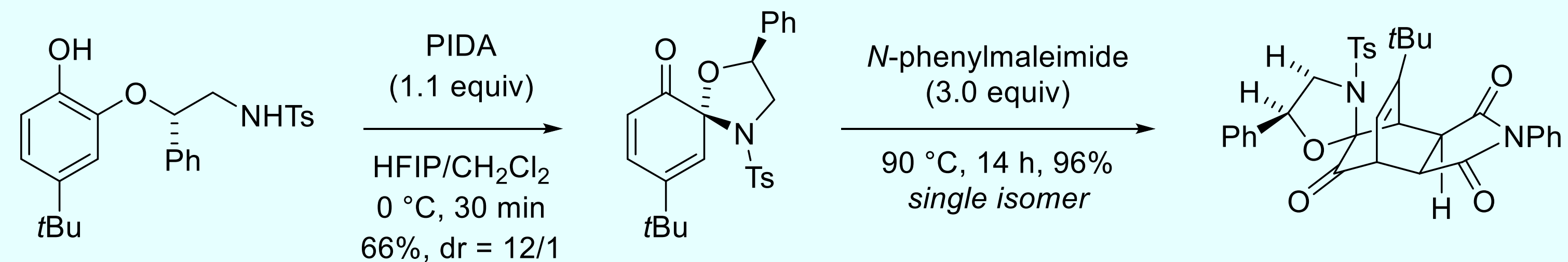
## Palladium-Catalyzed Carbothiolation via Trapping of the $\sigma$ -Alkyl Palladium Intermediate with RSTIPS

Hosoya, Y.; Kobayashi, I.; Mizoguchi, K.; Nakada, M. *Org. Lett.* **2019**, *21*, 8280-8284.



## Synthesis and Reaction of *ortho*-Benzoquinone Monohemiaminals

Saito, E.; Matsumoto, Y.; Nakamura, A.; Namera, Y.; Nakada, M.  
*Org. Lett.* **2018**, *20*, 692-695.



## Scheme 6. Developed Asymmetric Organocatalysis

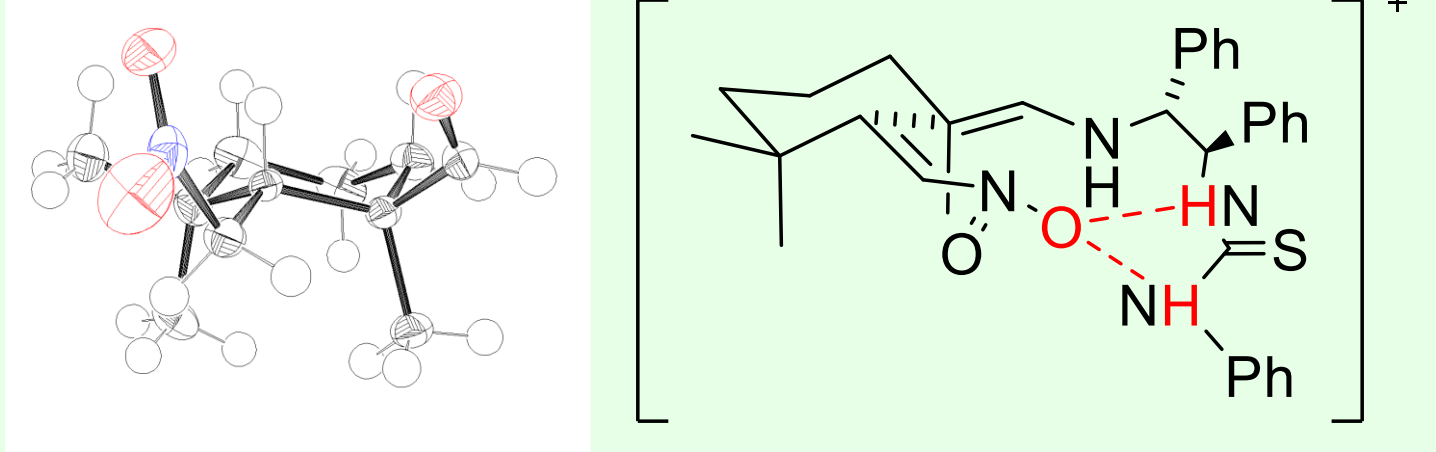
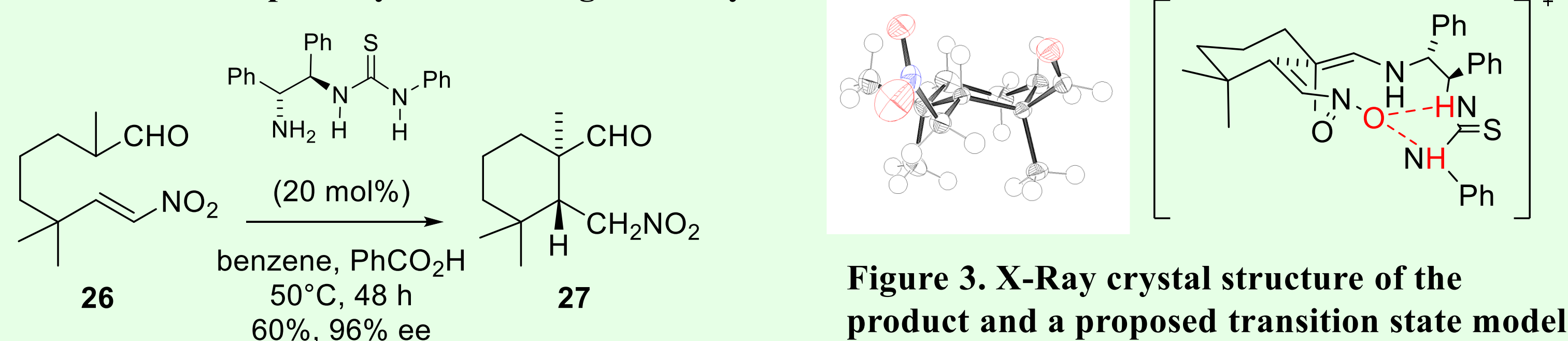


Figure 3. X-Ray crystal structure of the product and a proposed transition state model

## Scheme 1-2. Synthesis and Stereoselective Diels-Alder Reaction of 34 Affording Atisane Scaffold

