

# Asymmetric Reaction of Indole and Enynol Catalyzed by Phosphoric Acid-Au(I) Complex

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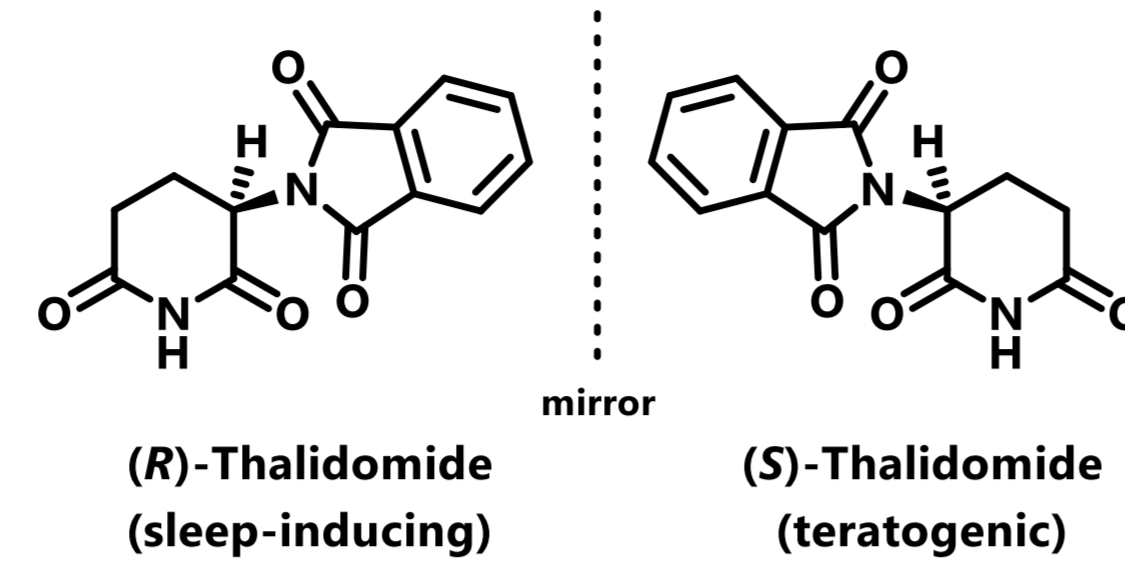
## 1. Introduction

Chiral molecule: nonsuperimposable molecule

- Same chemical and physical properties
- Different biological potency

Catalytic asymmetric synthesis

- Efficient method to obtain chiral compounds

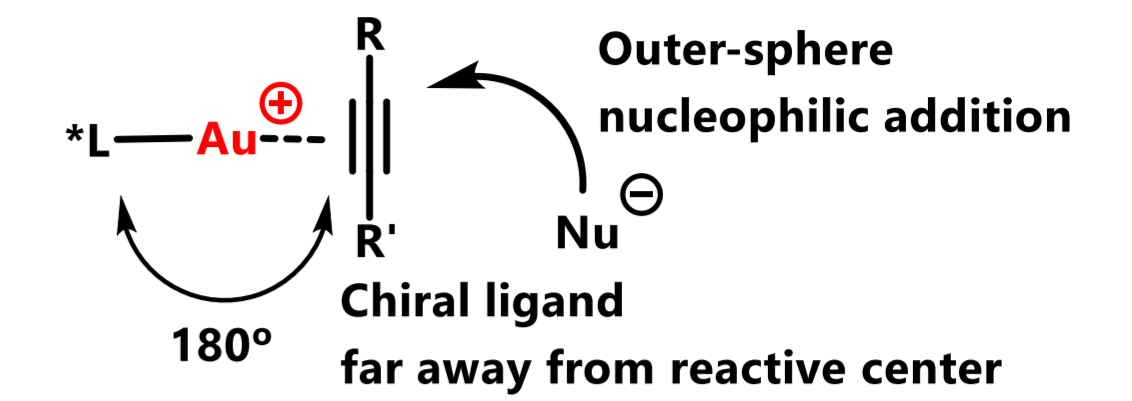


Au(I) catalytic reactivity

- $\pi$ -Bond activator

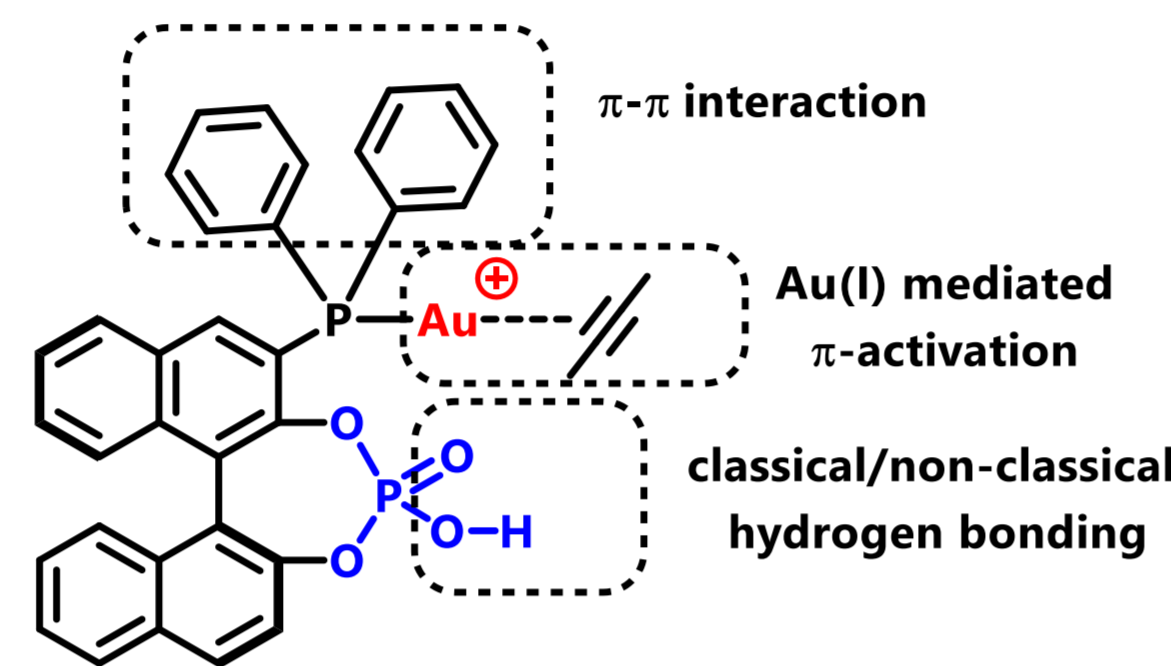
Limitations

- Linear dicoordination geometry  
→ Difficulties in asymmetric induction

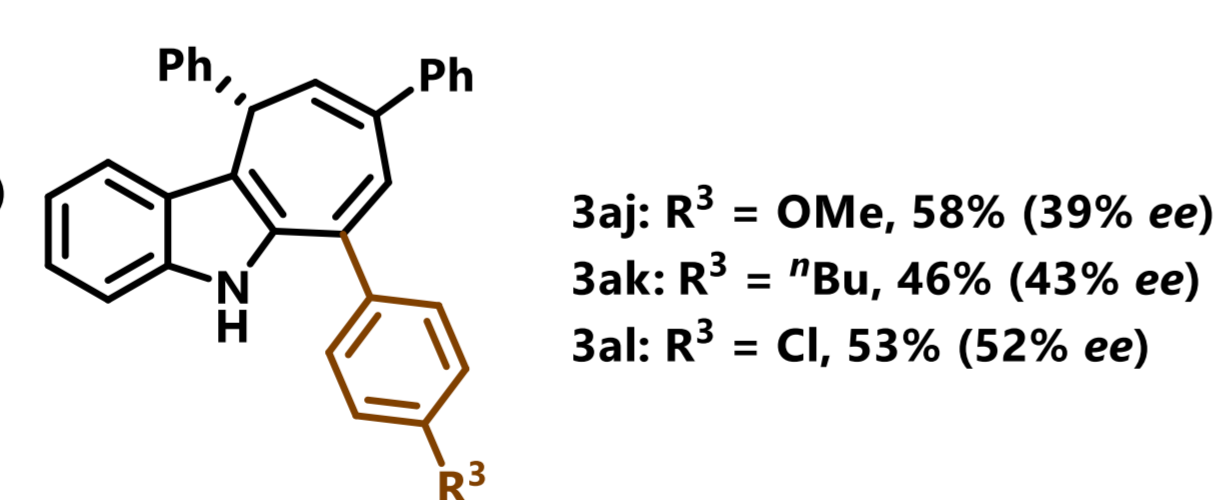
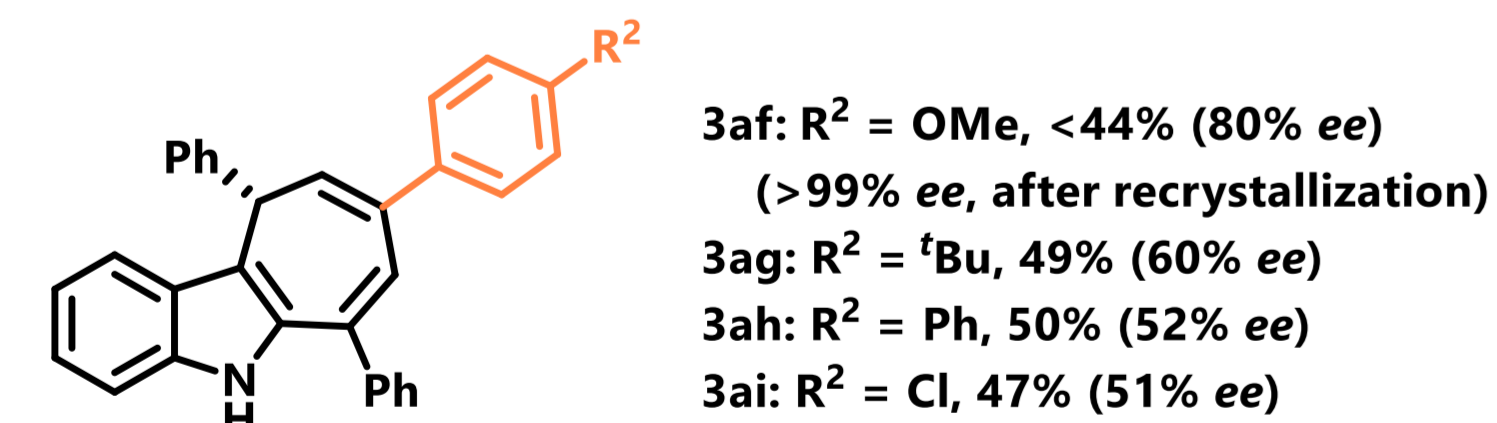
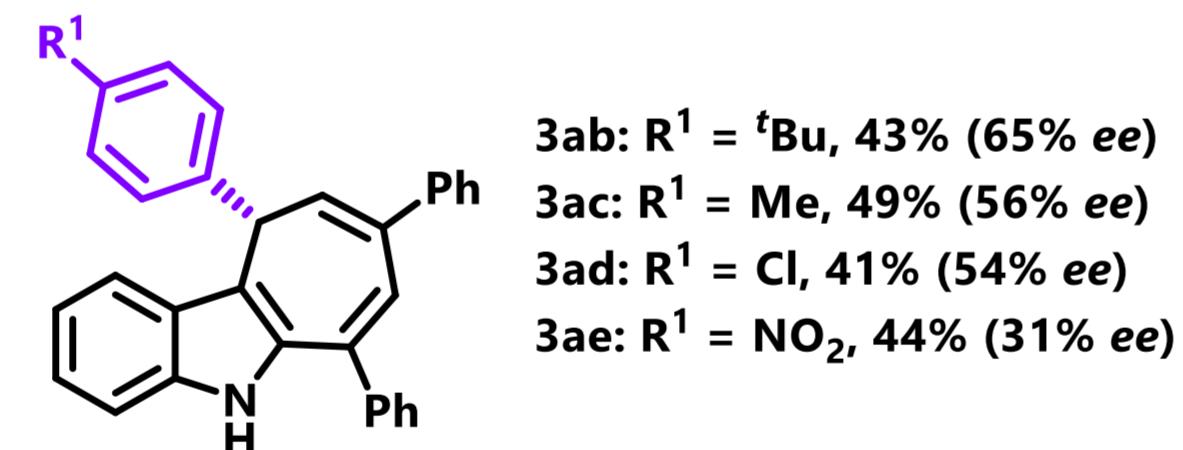
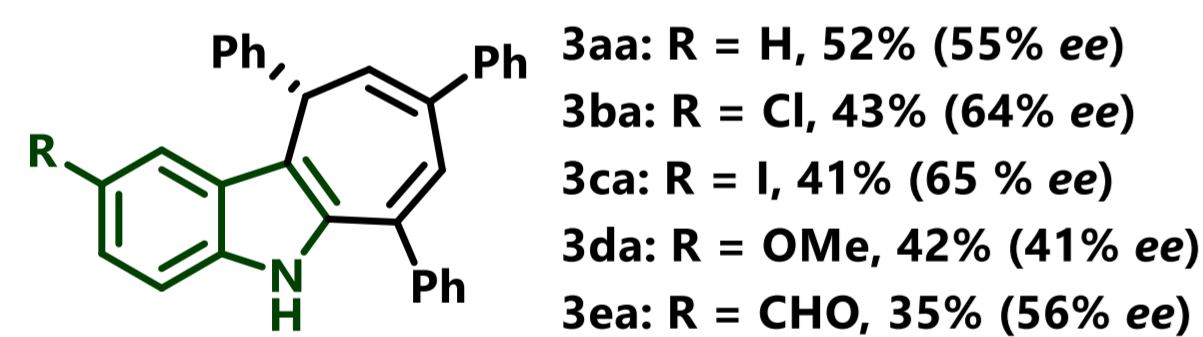
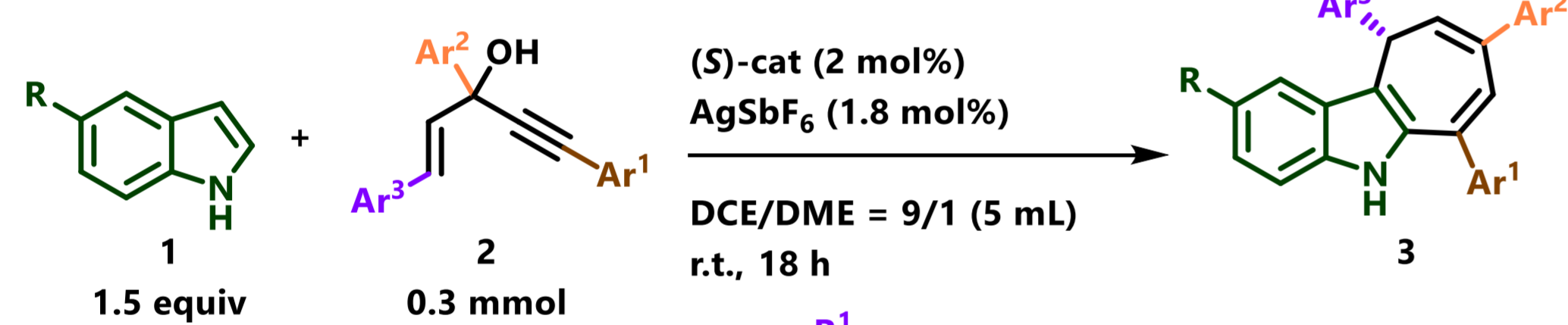


## 2. Concept

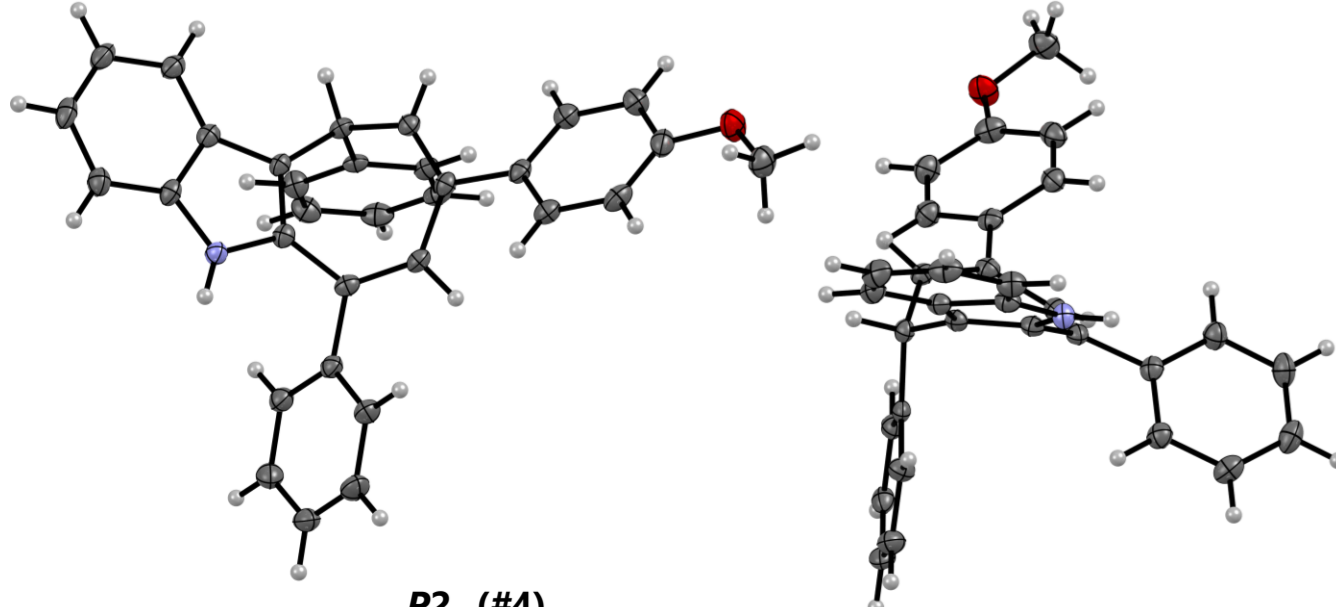
- Cationic Au(I) moiety  
→ Catalytic active center
- Phosphoric acid moiety:  
O-H: Brønsted acid (proton donor)  
P=O: Lewis base (proton acceptor)  
→ Hydrogen bonding
- Diphenylphosphine moiety:  
→  $\pi$ -Interaction ( $\pi \cdots \pi$ ,  $\text{OH} \cdots \pi$ ,  $\text{CH} \cdots \pi$ , etc.)



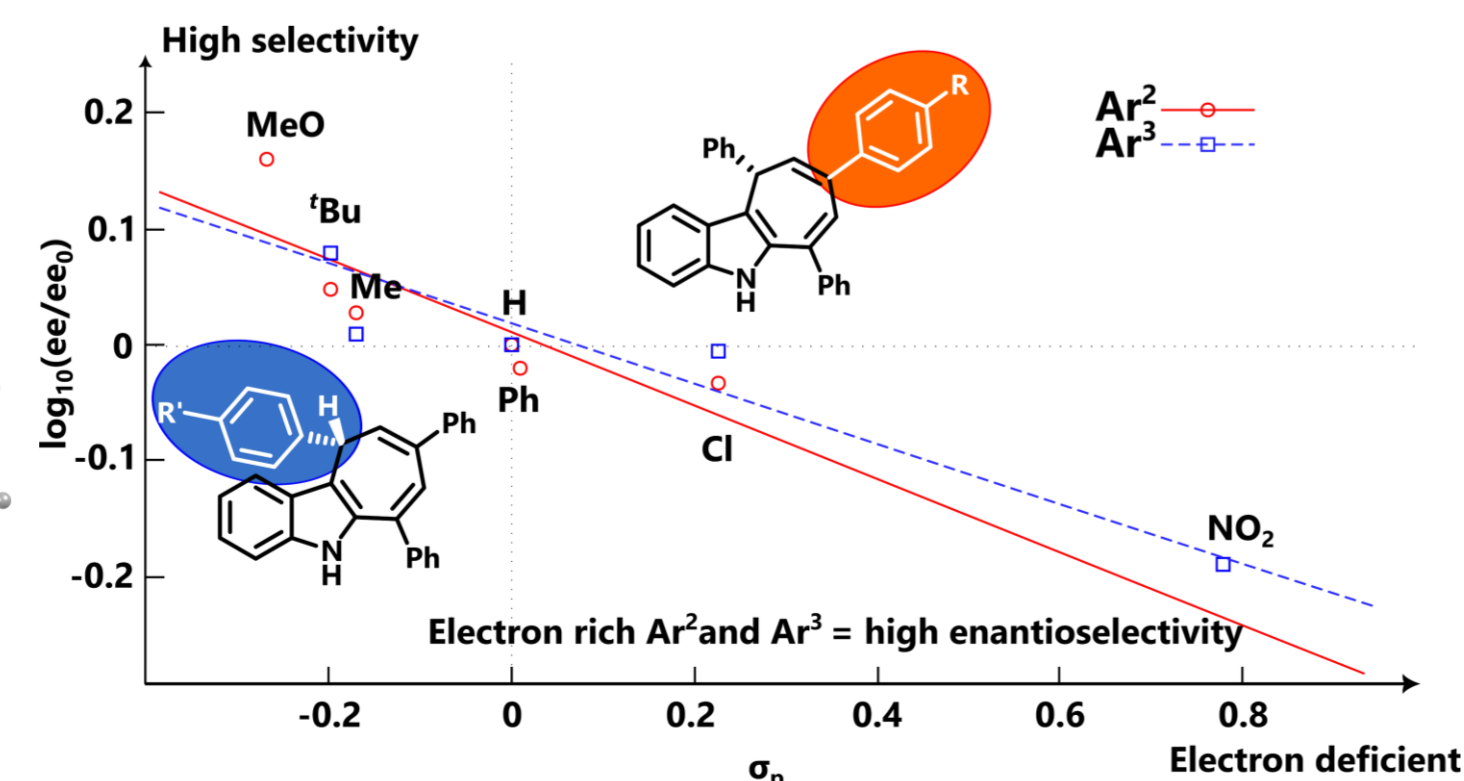
## 3. Result



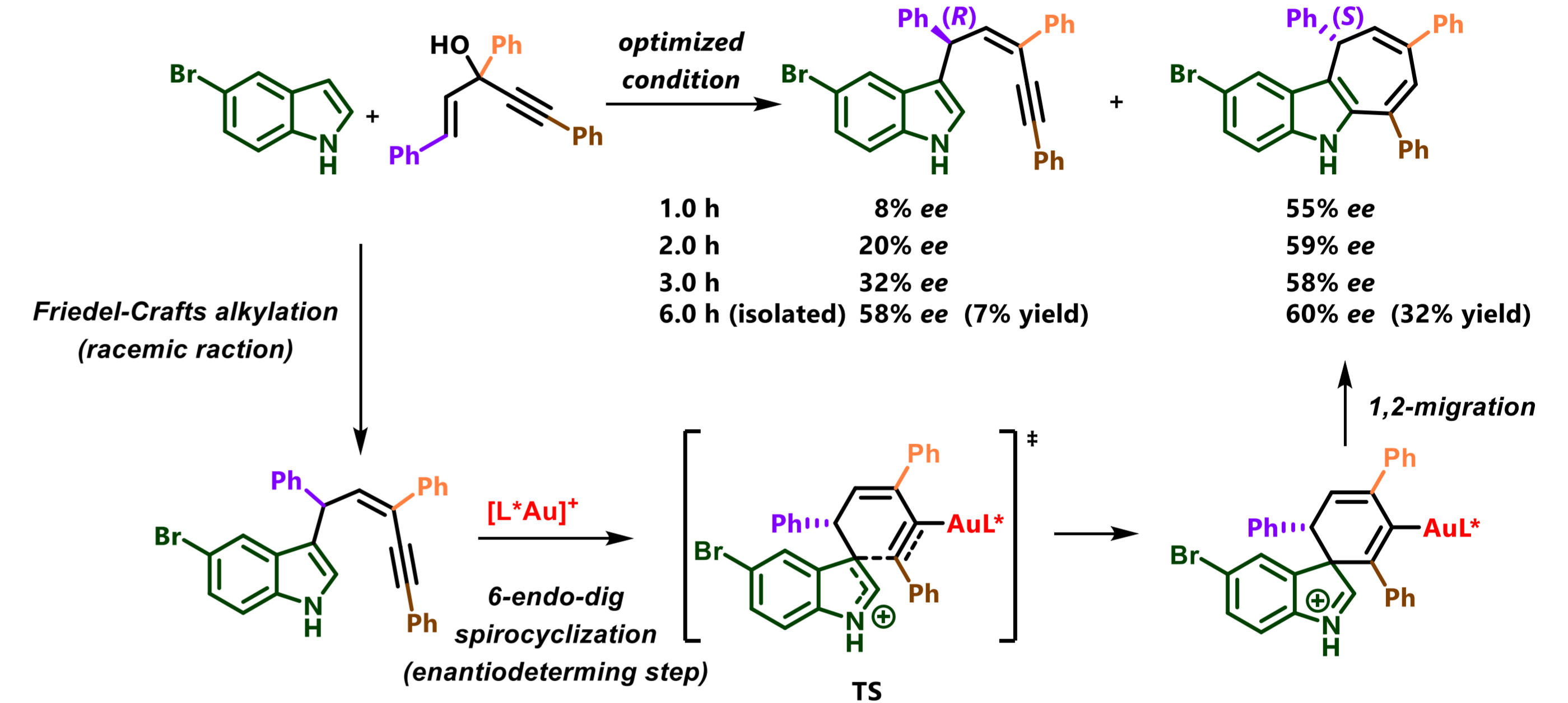
molecular structure of (S)-3af



P2<sub>1</sub> (#4)  
R<sub>1</sub> = 0.0451  
wR<sub>2</sub> = 0.1246  
Flack parameter, x = 0.01 (9)



## 4. Mechanistic study



## 5. NCI and QTAIM analysis

