

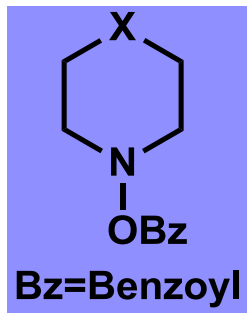
# Two Recent Publications Using O-Benzoyl Hydroxylamine Derivatives as Both Oxidant and Substrate

Dongqi Wang

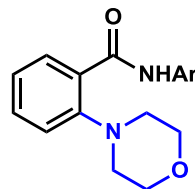
Zhao Group Meeting

2013.11.25

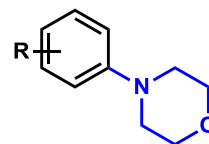
# O-Benzoyl Hydroxylamines



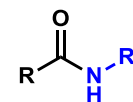
## Selected Cases:



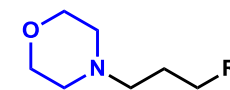
Yu, *JACS*, 2011



Miura, *ACIE*, 2011

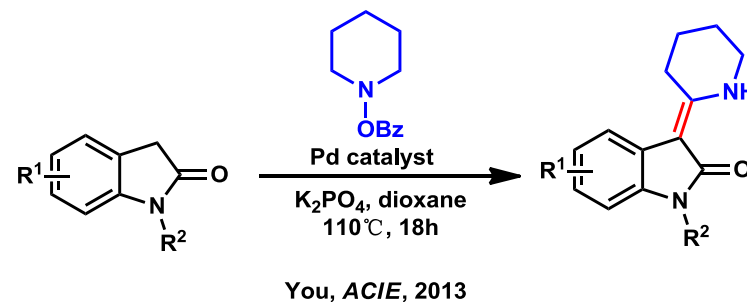
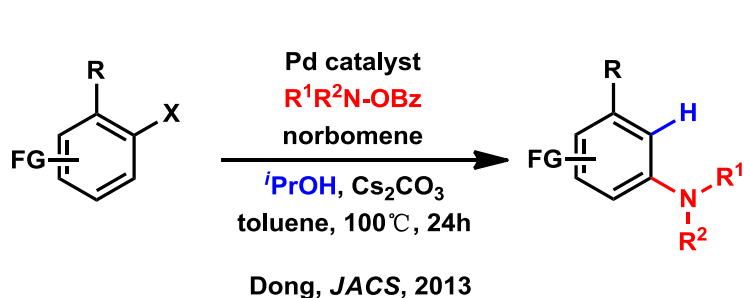


Bode, *ACIE*, 2012

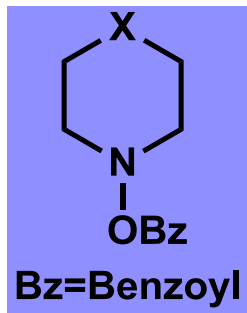


Lalic, *JACS*, 2012

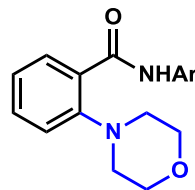
*An widely used aminating reagent*



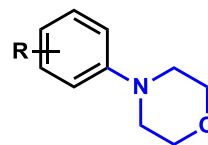
# O-Benzoyl Hydroxylamines



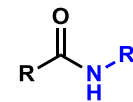
## Selected Cases:



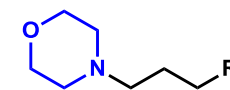
Yu, *JACS*, 2011



Miura, *ACIE*, 2011

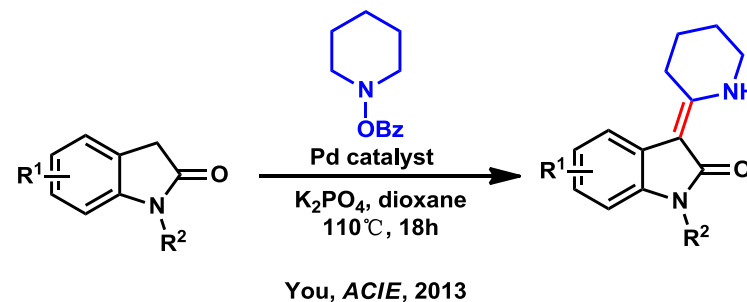
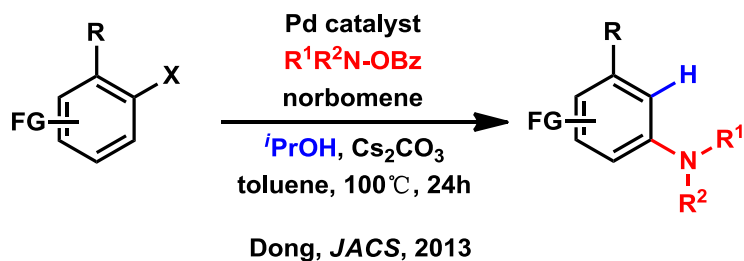


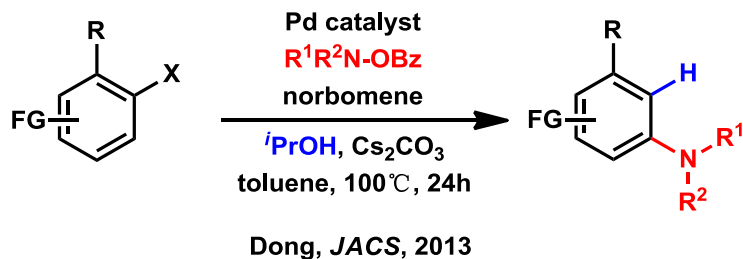
Bode, *ACIE*, 2012



Lalic, *JACS*, 2012

*An widely used aminating reagent*





- *amination at the ortho instead of ipso position*
- *broad substrate scope*
- *good functional group tolerance*

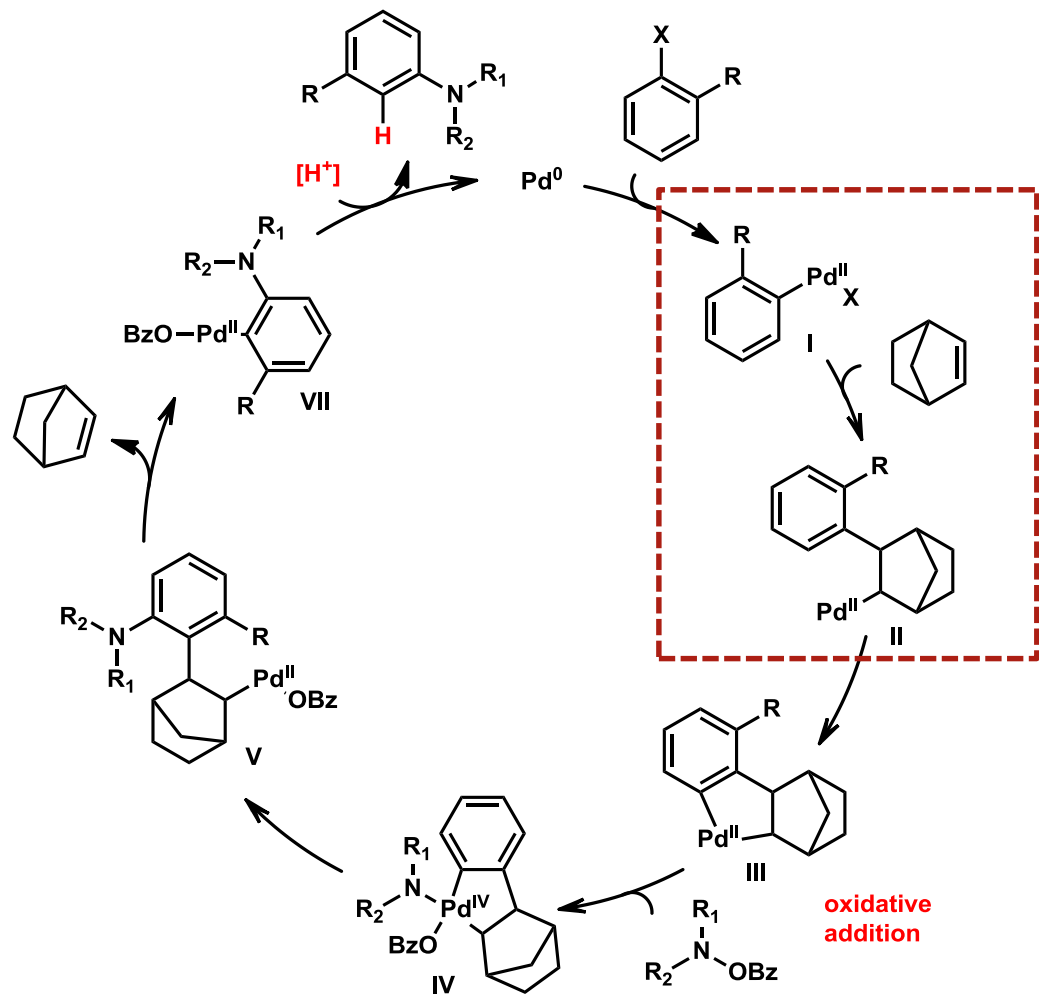
2013: Buchwald-Hartwig amination **#1** reaction performed in pharma

There are about **25** results of catellani reaction searched by SCIfinder

The **Combination** of these two classic reactions

# Outline

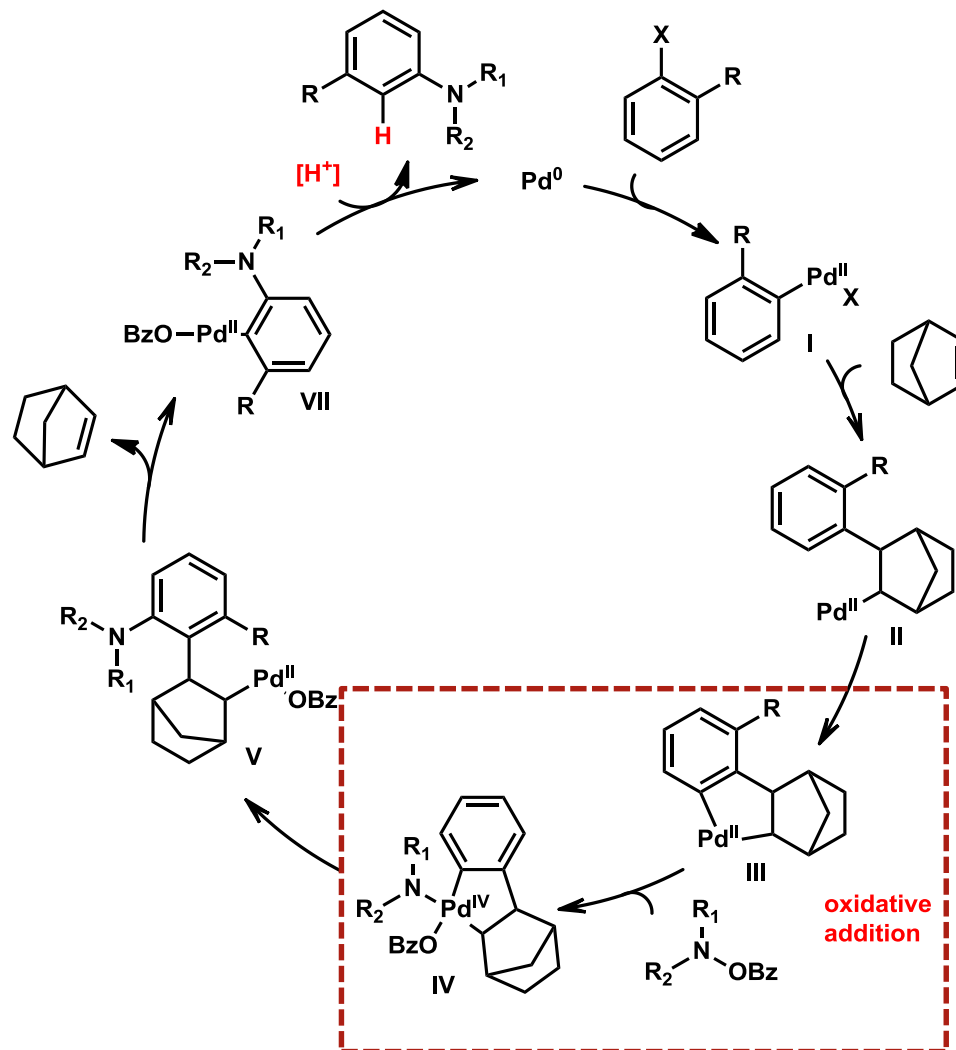
## ■ Catalyst and Ligand



# Outline

## Catalyst and Ligand

## A Proper Nitrogen-Based Oxidant

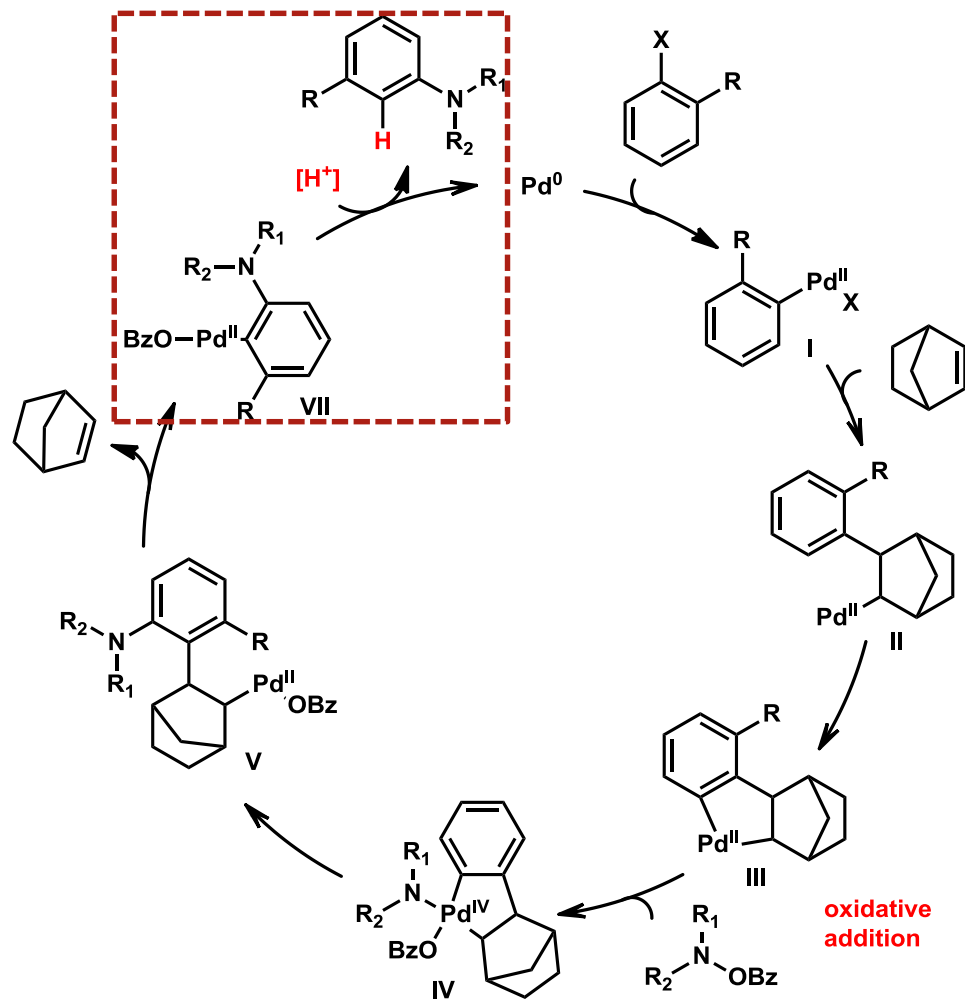


# Outline

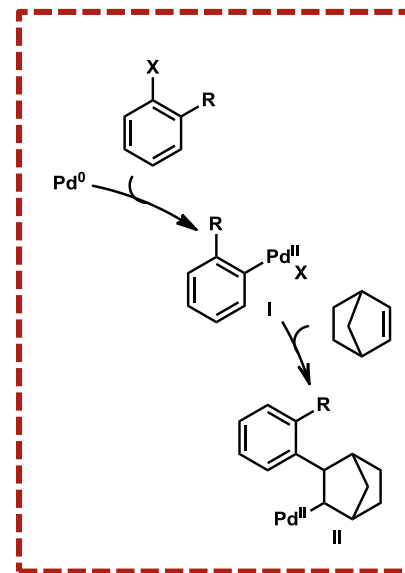
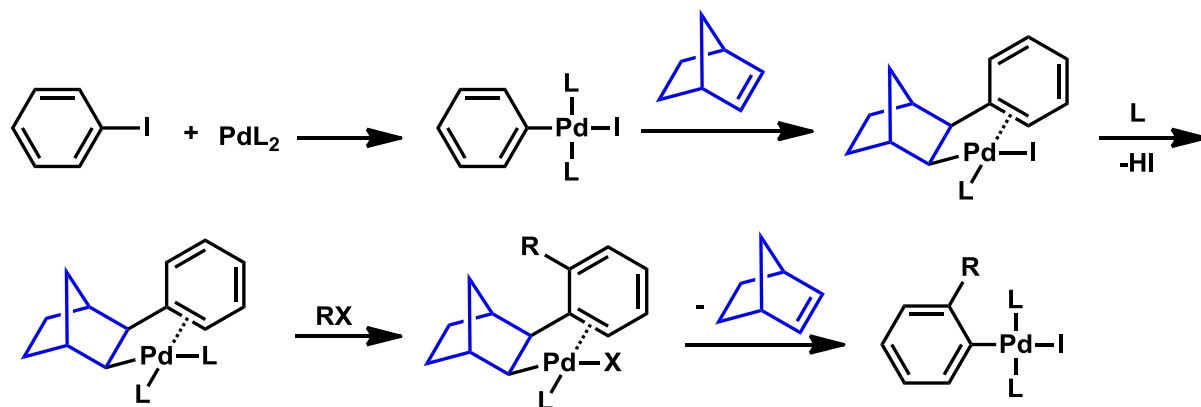
## ■ Catalyst and Ligand

## ■ A Proper Nitrogen-Based Oxidant

## ■ A Proper Reductant



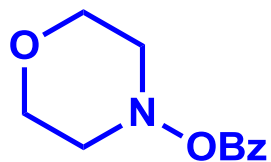
## The Norbornene (NBE) is Important



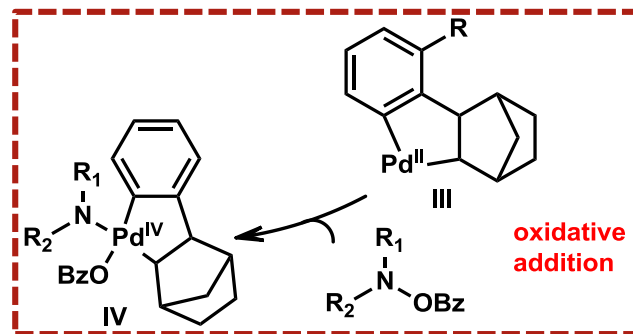
*Catalyst and Ligand*

- $\text{Pd}(\text{OAc})_2$  is the best catalyst
- Tris(4-methoxyphenyl)phosphine is the most efficient ligand





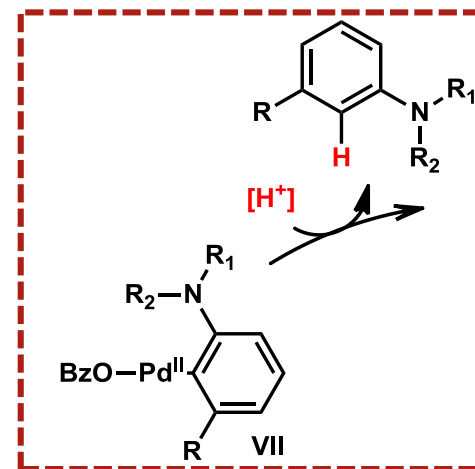
N-benzoyloxycarbonyl piperazine was the optimal oxidant.



*Oxidant*

- The oxidant needs to provide the amine group
- The oxidant has to be stronger than aryl halides to avoid homo-Catellani coupling
- The oxidant cannot be too strong to destroy the labile NBE or the Pd(0) catalyst

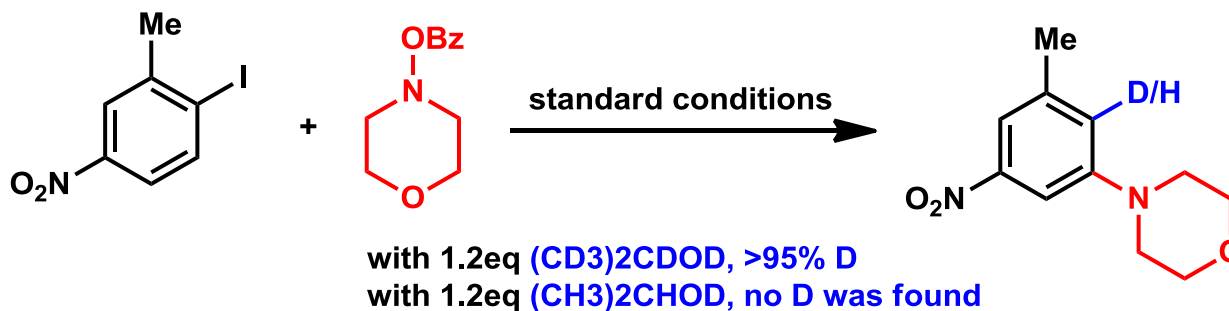
- The reductant needs to be orthogonal to the oxidant and capable of introducing a hydrogen at the ipso-position
- The reductant can not too strong to reduce the aryl Pd I (direct arene reduction) or the alkyl Pd intermediate (reductive Heck reaction)

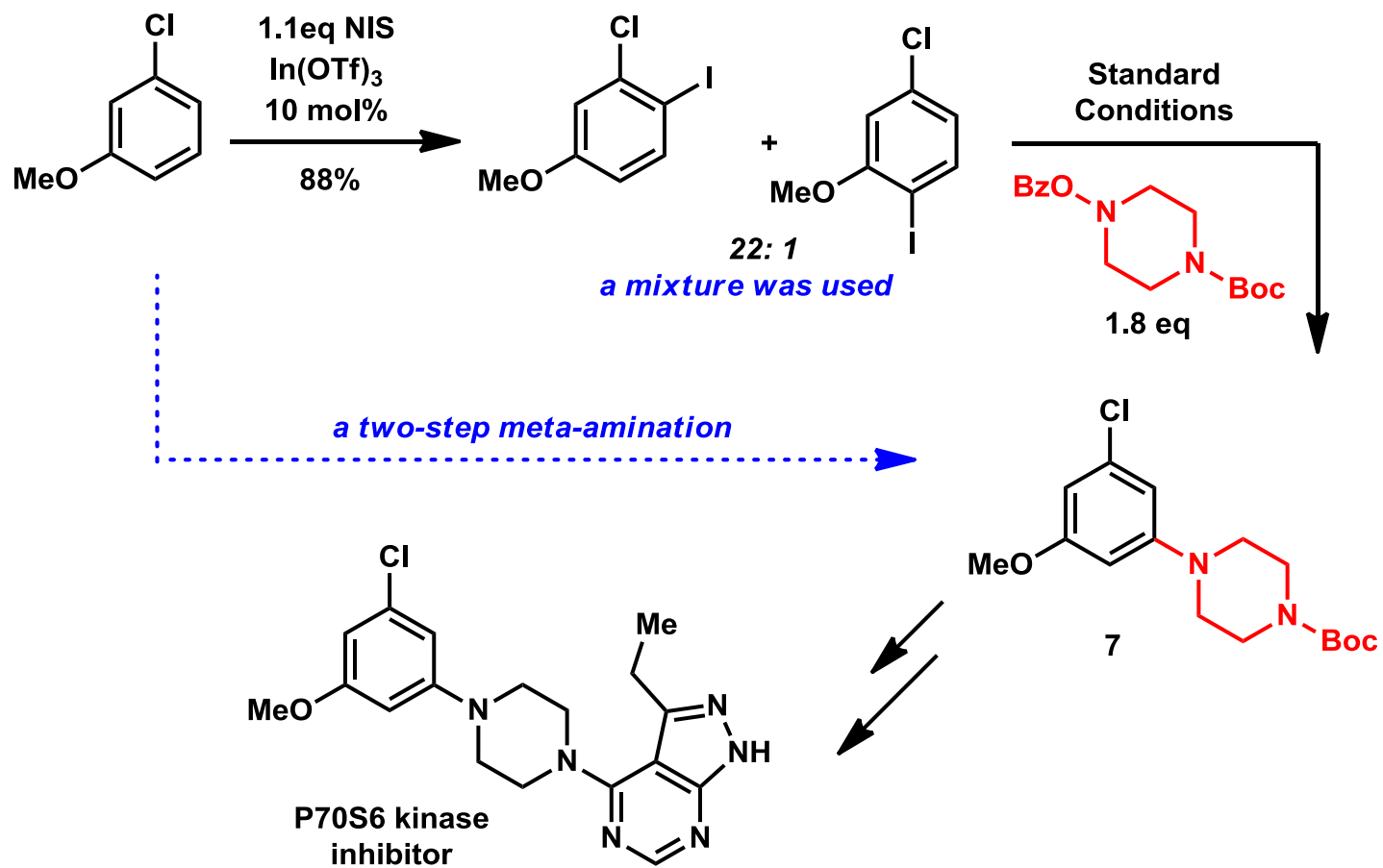


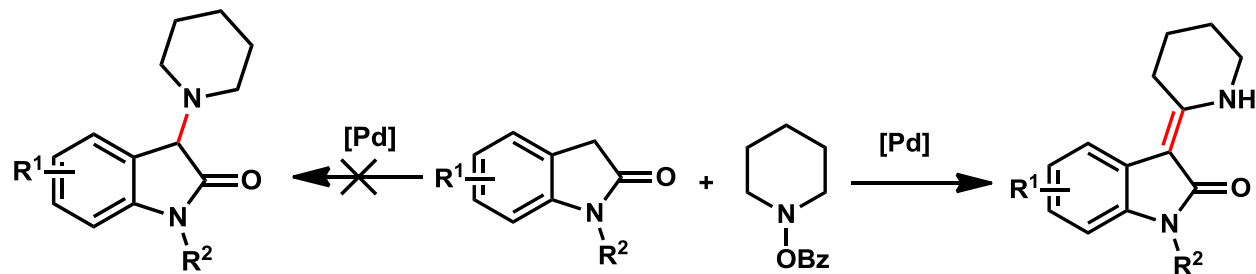
*Reductant*

*iso-Propanol was the optimal oxidant*

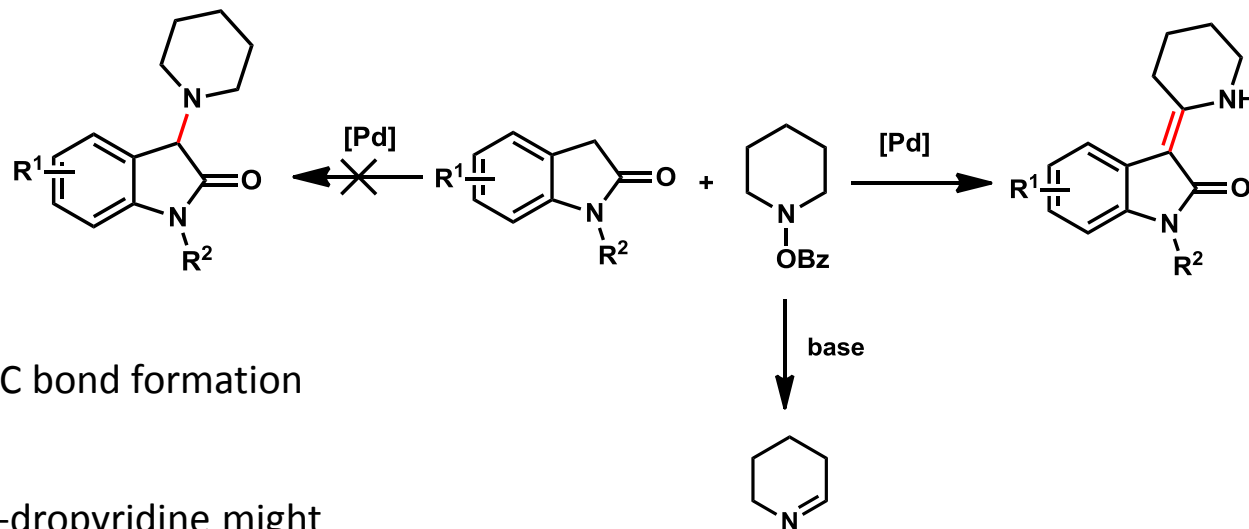
### Deuterium-labelling study



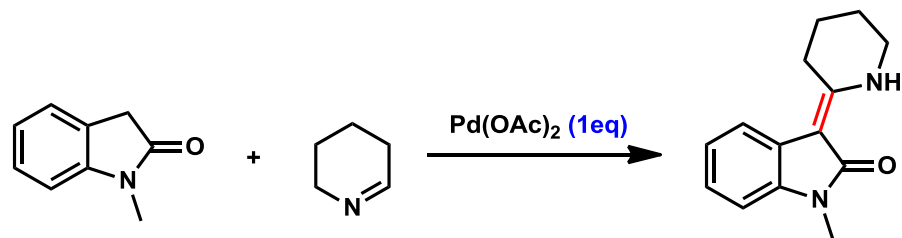


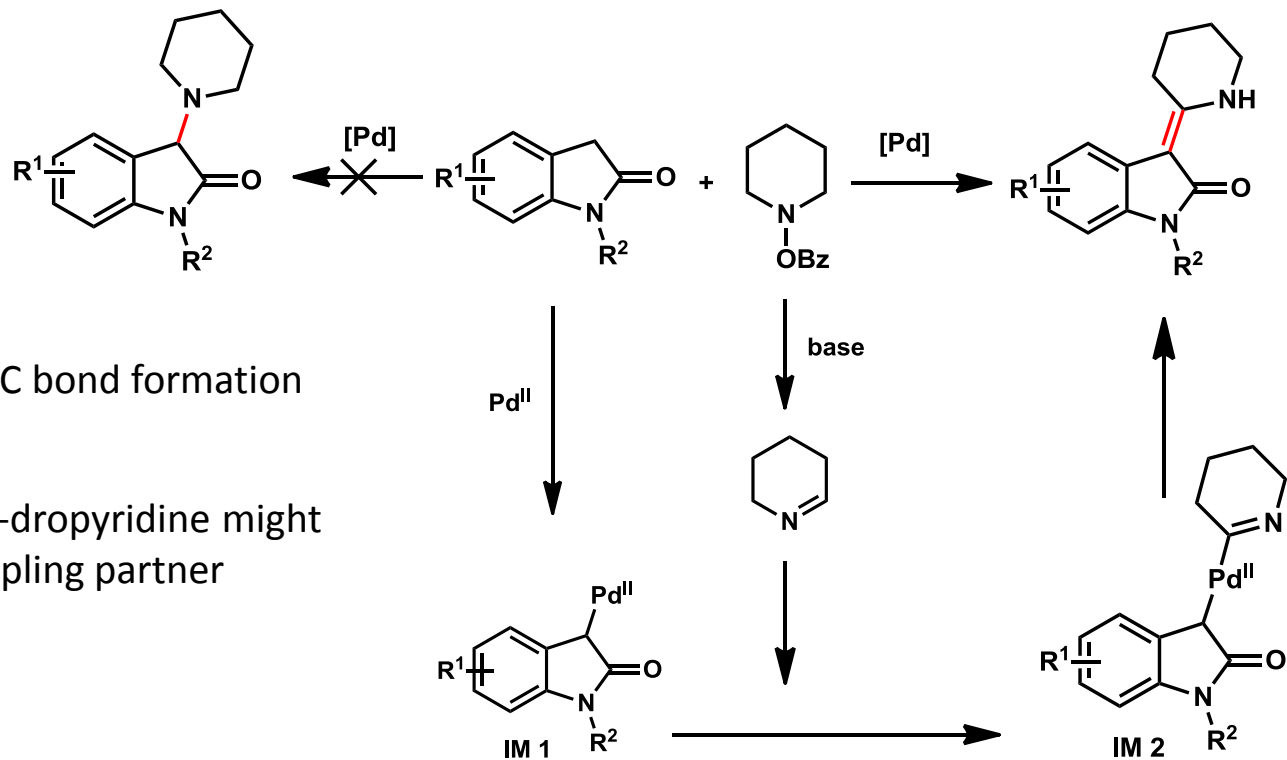


■ Unexpected C=C Bond Formation



- unexpected C=C bond formation
- 2,3,4,5-tetrahy-dropyridine might be the real coupling partner





- unexpected C=C bond formation
- 2,3,4,5-tetrahydropyridine might be the real coupling partner

Thanks For Your Attention