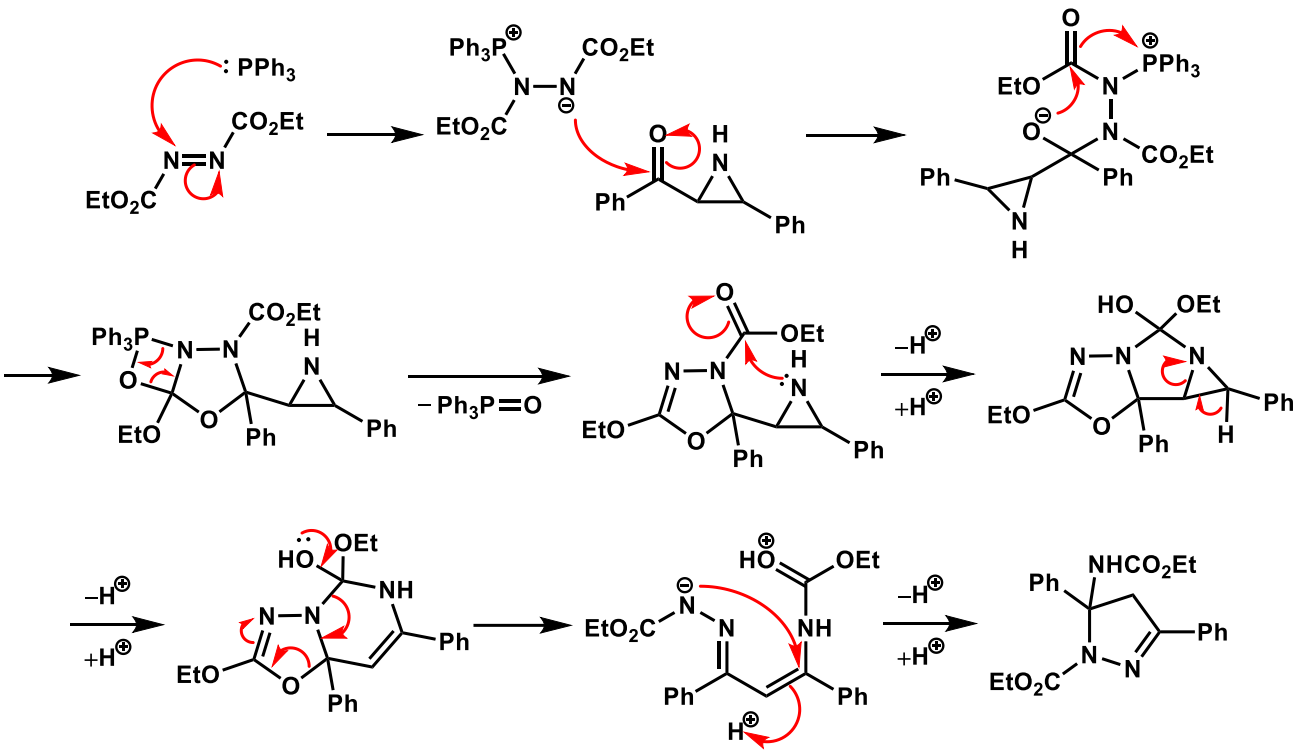
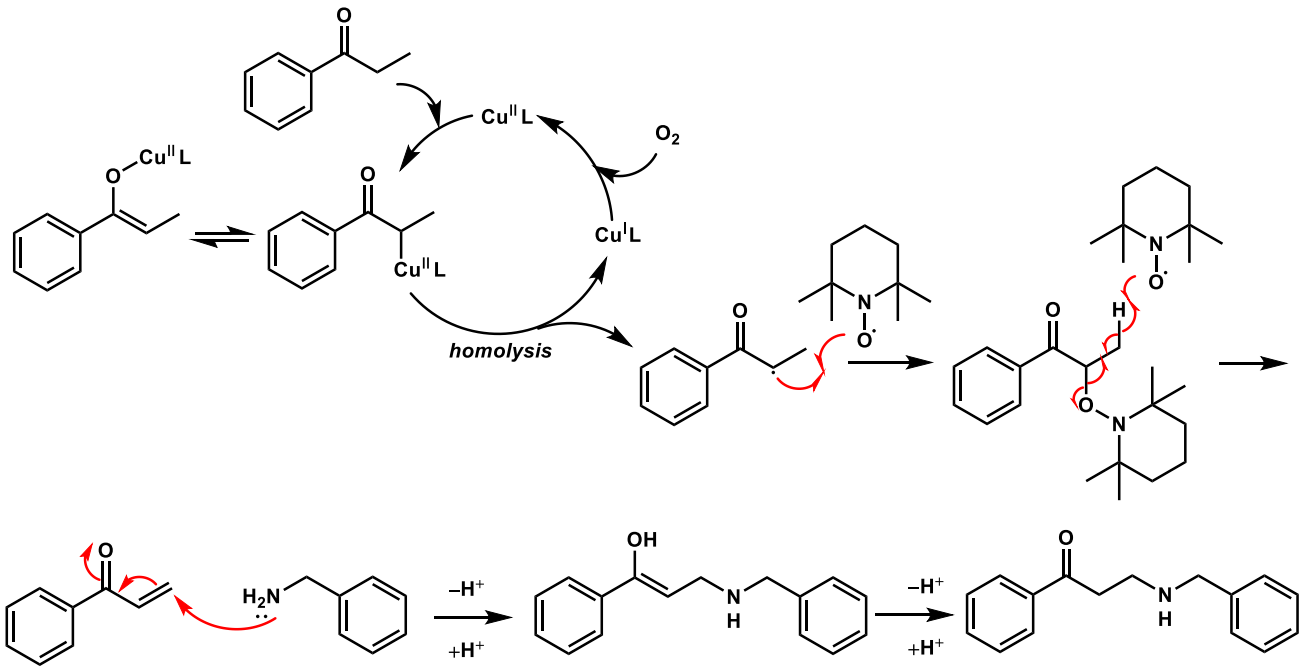
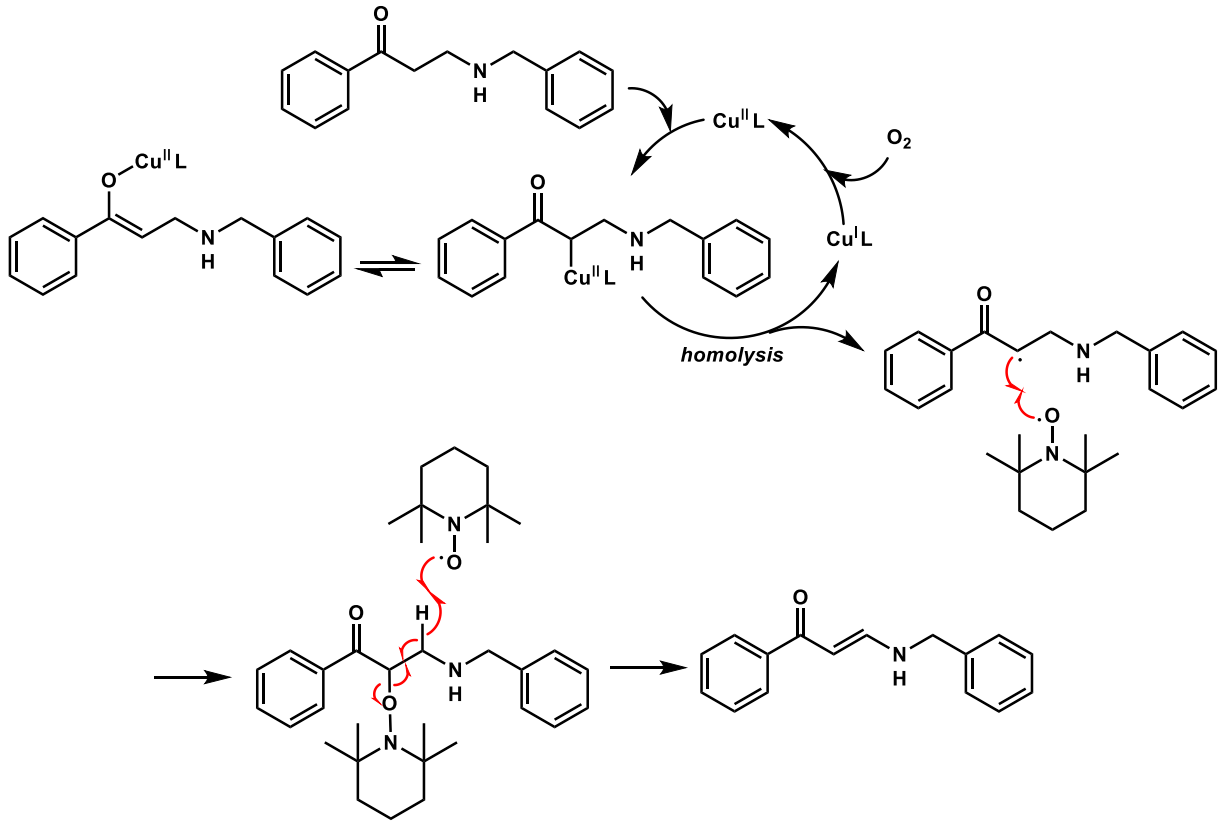
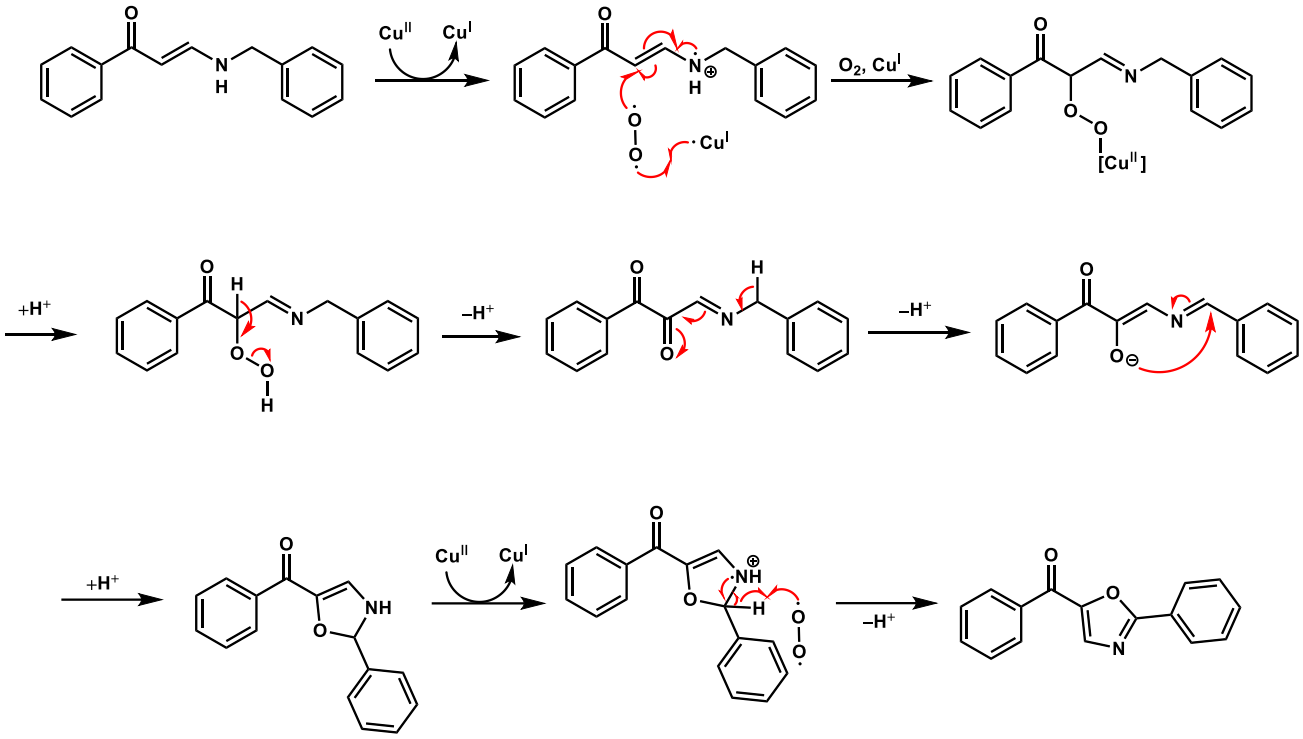
1


: PPh3
CO2Et
N=N
EtO2C
Ph3P
CO2Et
N–N
EtO2C
O
H
N
Ph
Ph
EtO
O
PPh3
N
O
N
CO2Et
Ph
Ph
N
H
Ph3P
CO2Et
H
N–N
O
EtO
O
Ph
N
Ph
– Ph3P=O
O
OEt
H
N–N
N
EtO
O
Ph
Ph
–H⊕
+H⊕
HO
OEt
N–N
N
EtO
O
Ph
Ph
H
–H⊕
+H⊕
HO
OEt
NH
N–N
Ph
EtO
O
Ph
HO
OEt
EtO2C
N
N
NH
Ph
Ph
H⊕
–H⊕
+H⊕
Ph
NHCO2Et
Ph
EtO2C
N
N

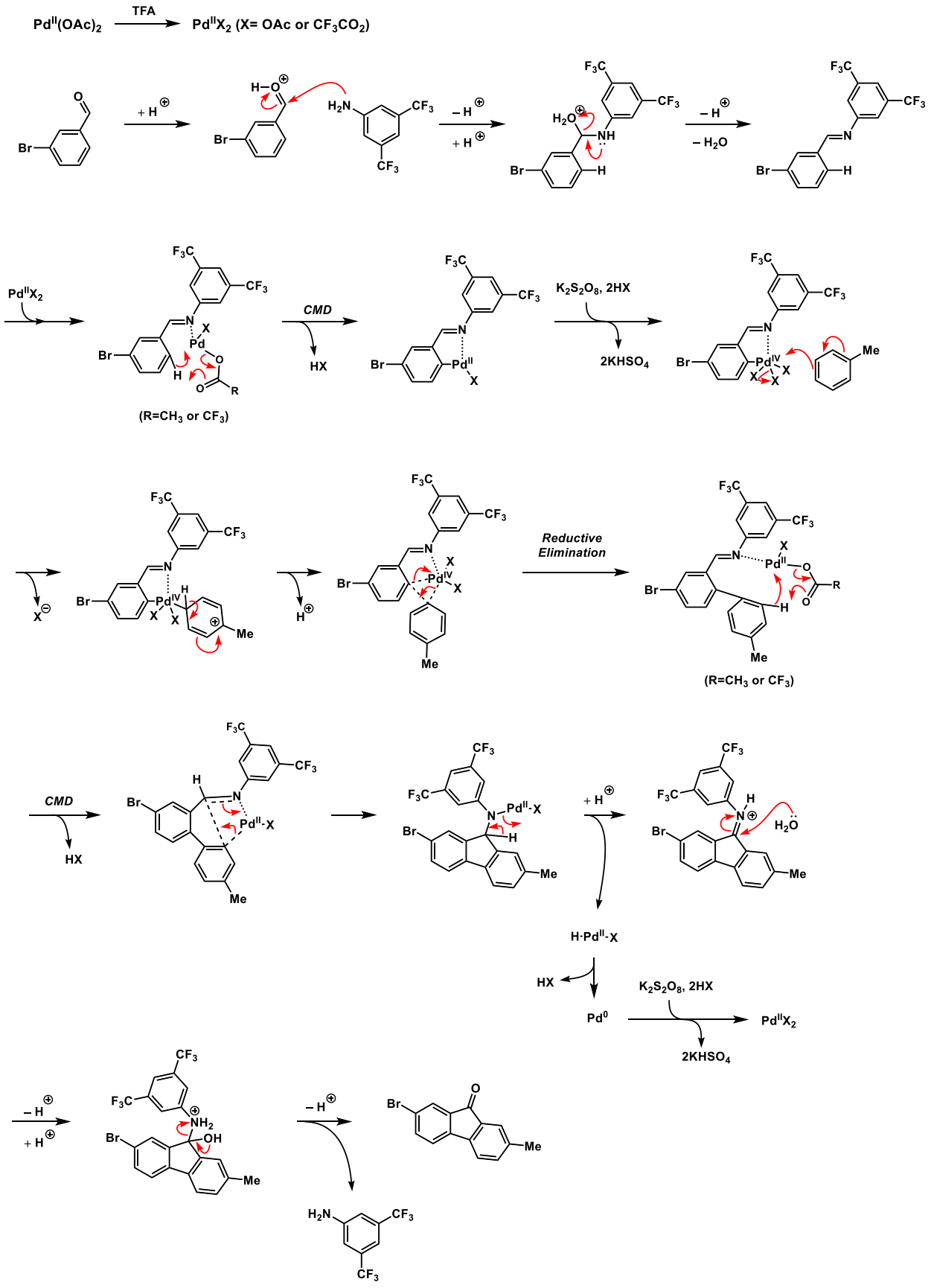
2


O
Cu^{II}L
O$_2$
Cu^{I}L
homolysis
N
O
H
H$_2$N
–H$^+$
+H$^+$
OH
NH


O
NH
Cu^{II}L
O$_2$
Cu^{I}L
homolysis
N
O
H

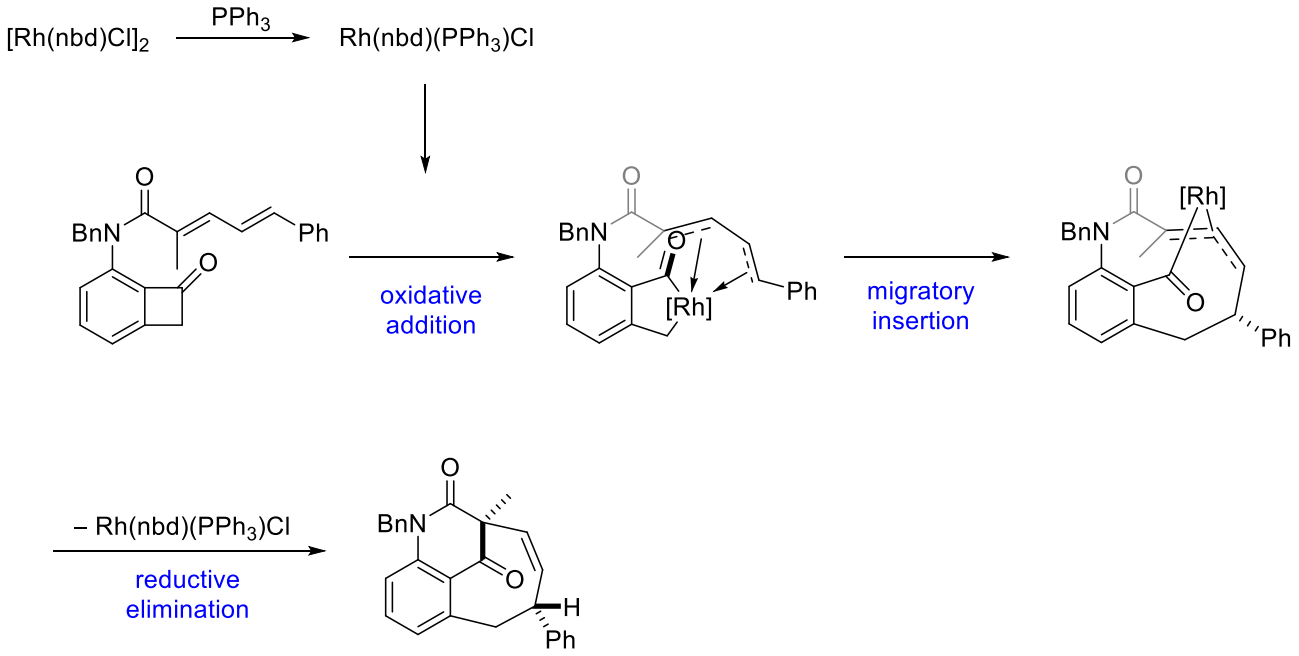

Cu^II
Cu^I
O2, Cu^I
[Cu^II]
+H+
–H+
–H+
+H+
Cu^II
Cu^I
–H+

3

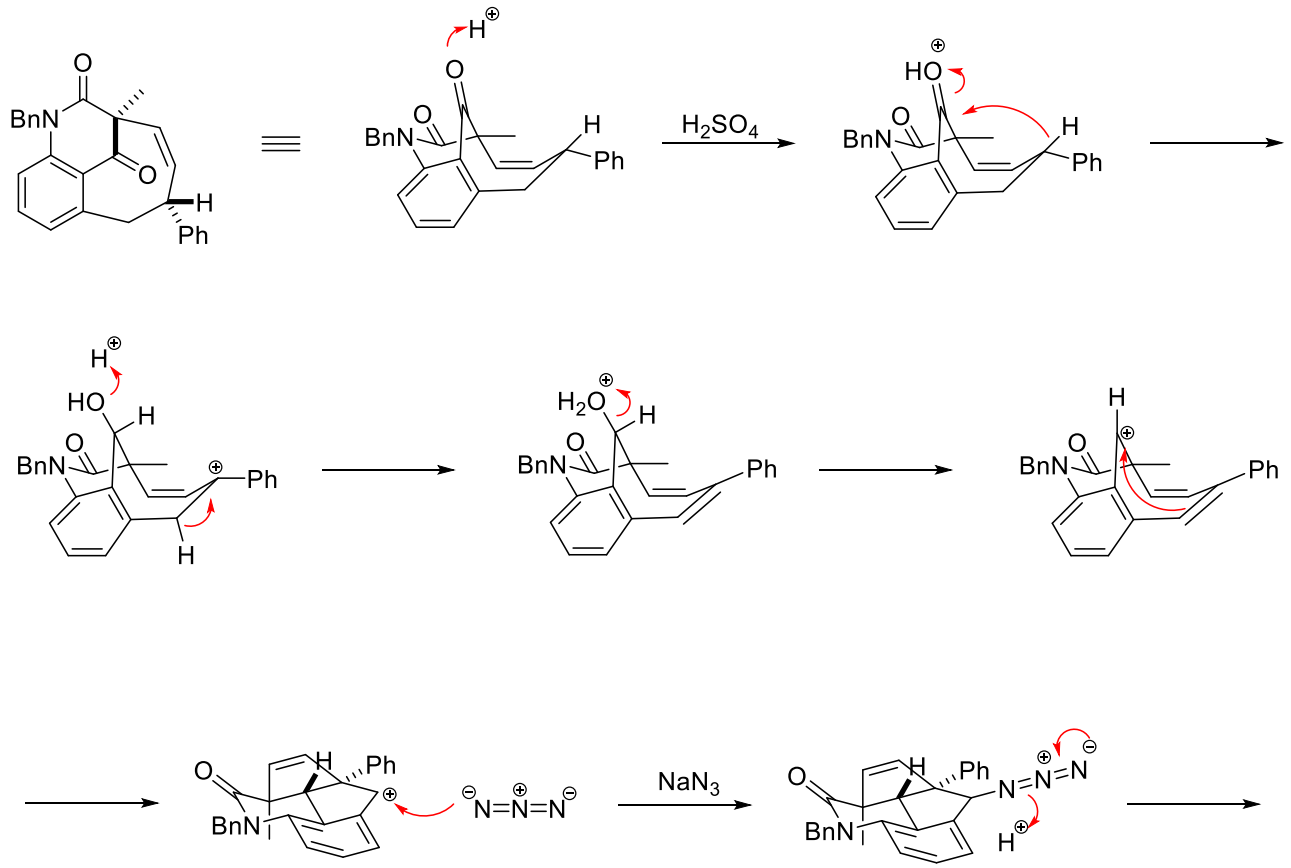

Pd^II(OAc)2
TFA
Pd^IIX2 (X= OAc or CF3CO2)
+ H
– H
– H2O
Br
CF3
F3C
NH
Pd^IIX2
CMD
HX
K2S2O8, 2HX
2KHSO4
Me
(R=CH3 or CF3)
Reductive Elimination
Pd^II-X
H·Pd^II-X
Pd0
OH
NH2

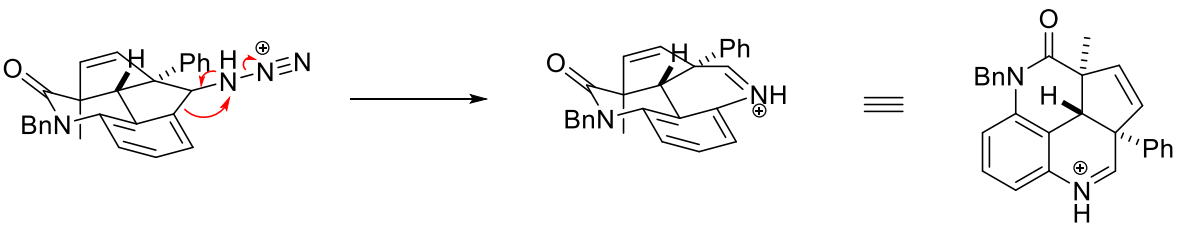
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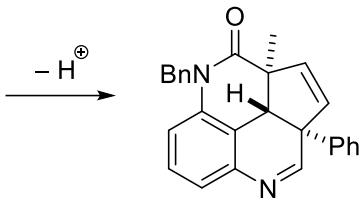
first step



second step




O
BnN
H
Ph
H
N
N
N
O
BnN
H
Ph
NH
O
BnN
H
Ph
N
H


– H
O
BnN
H
Ph
N