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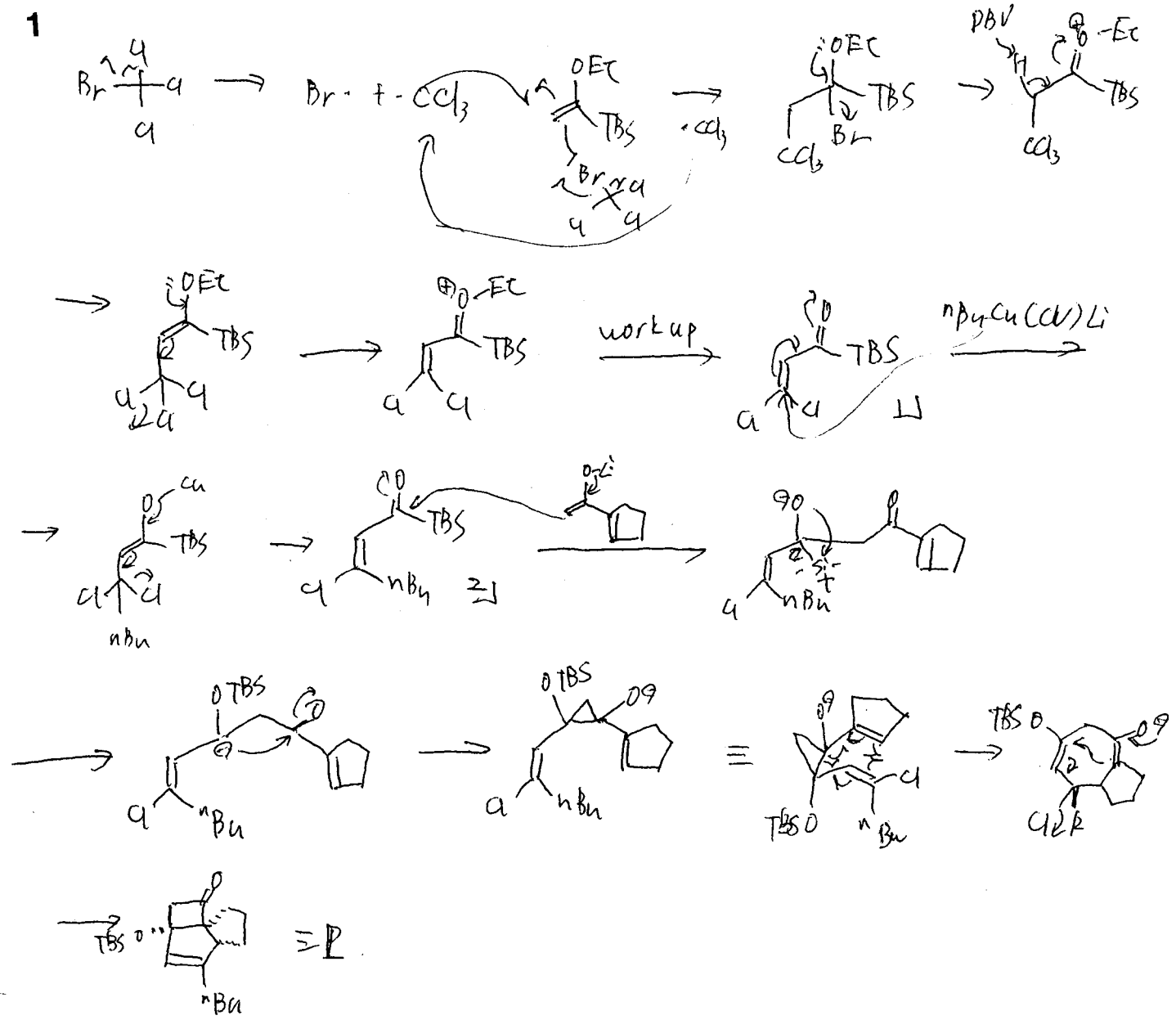

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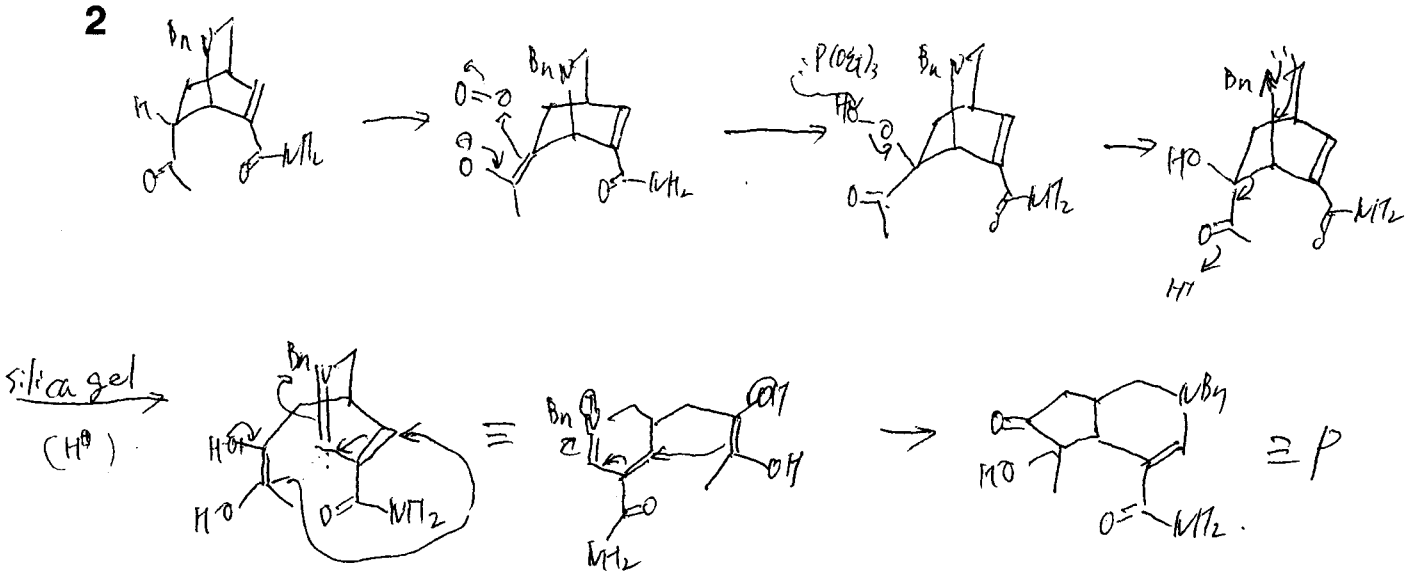

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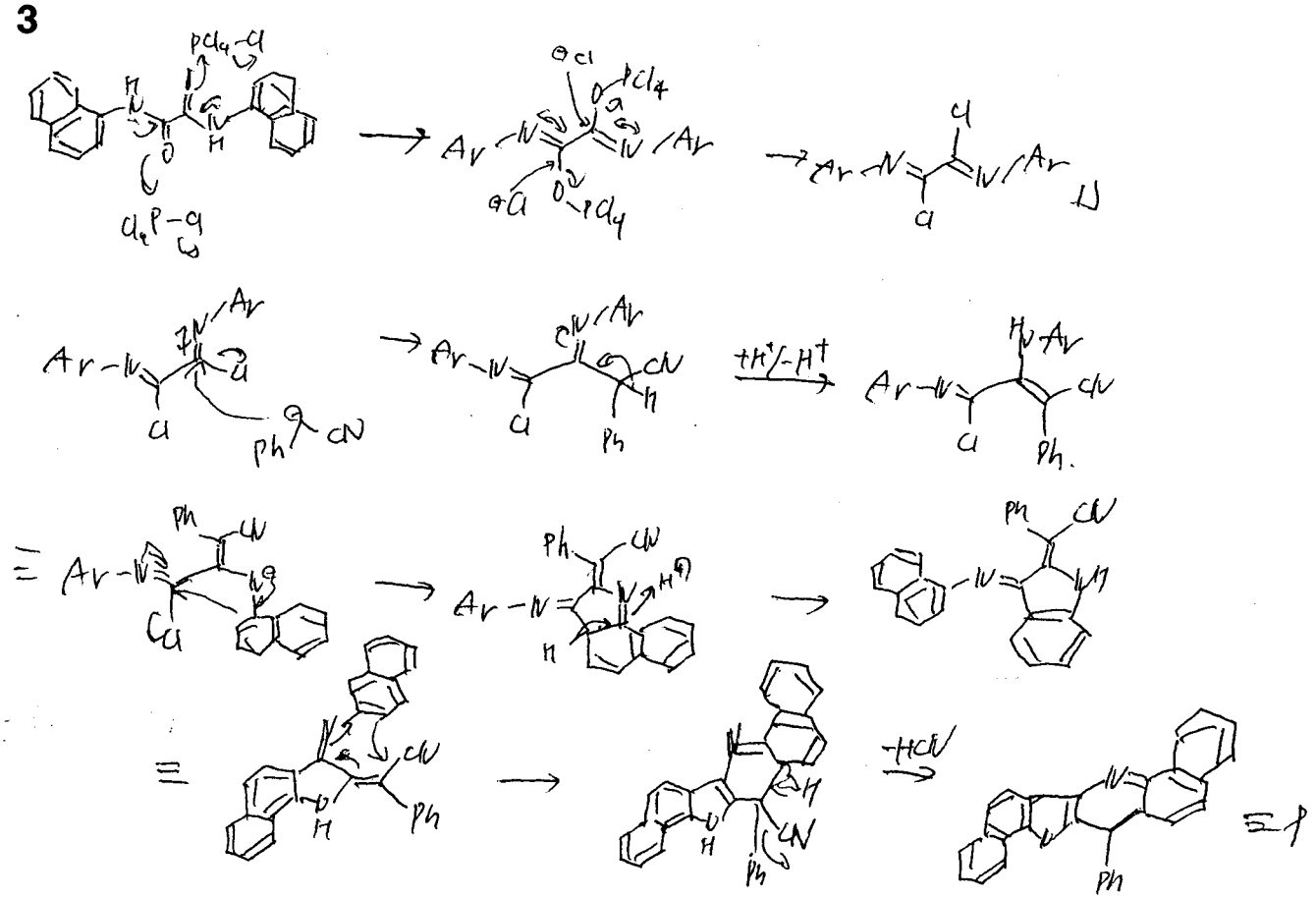

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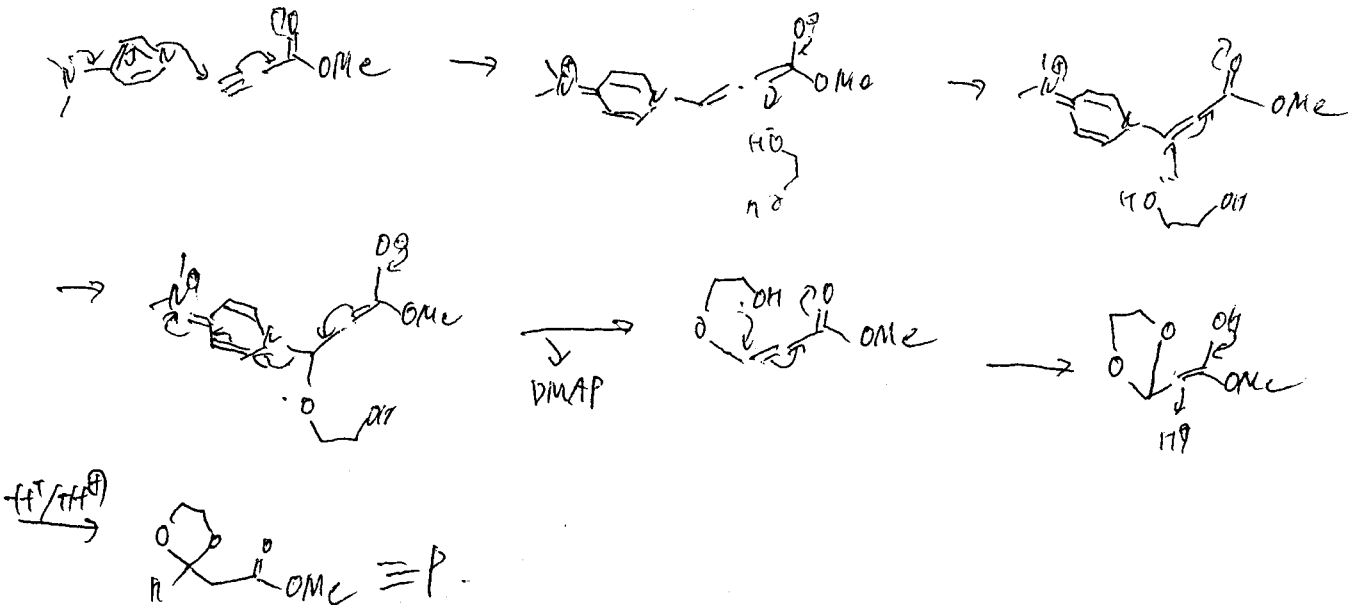

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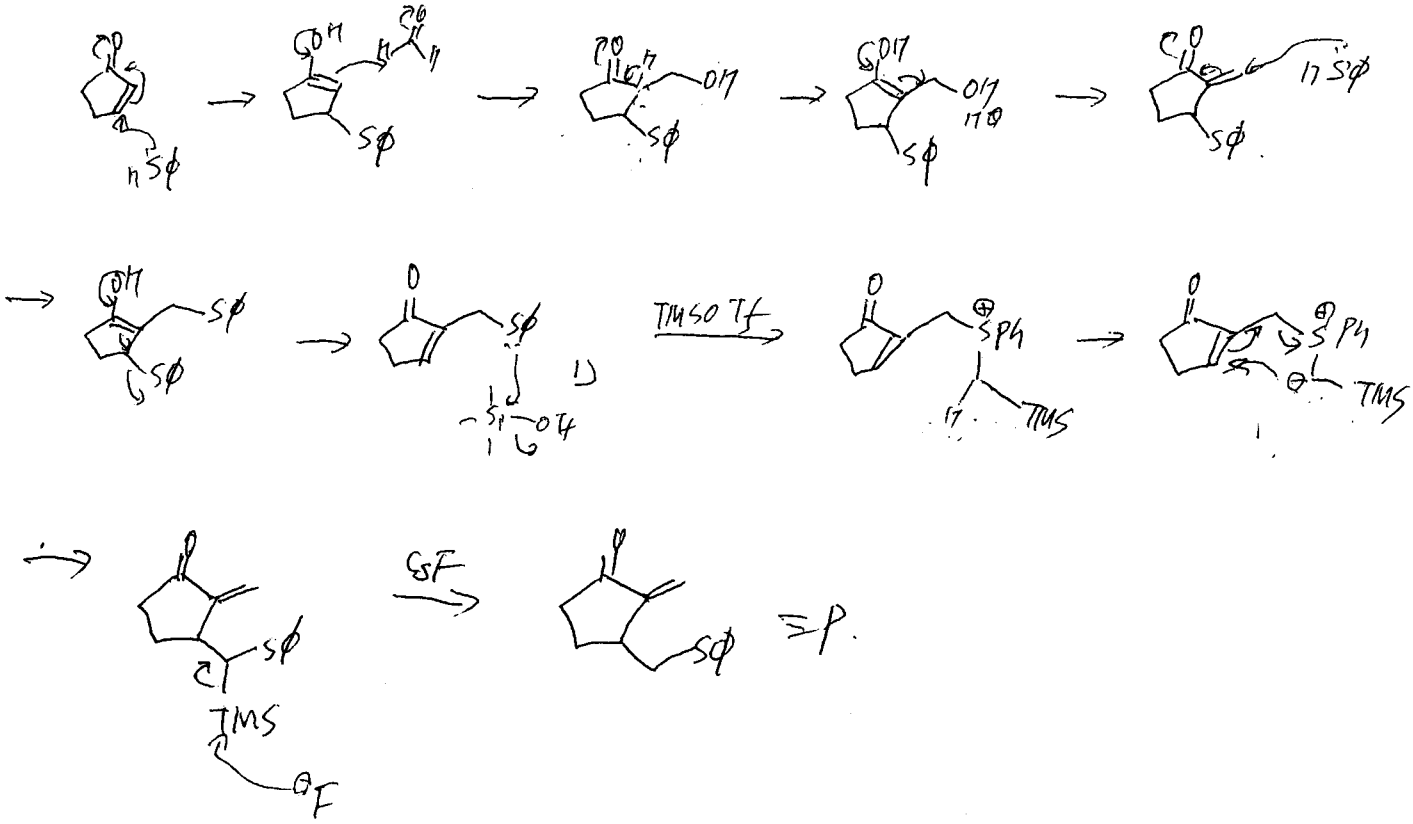

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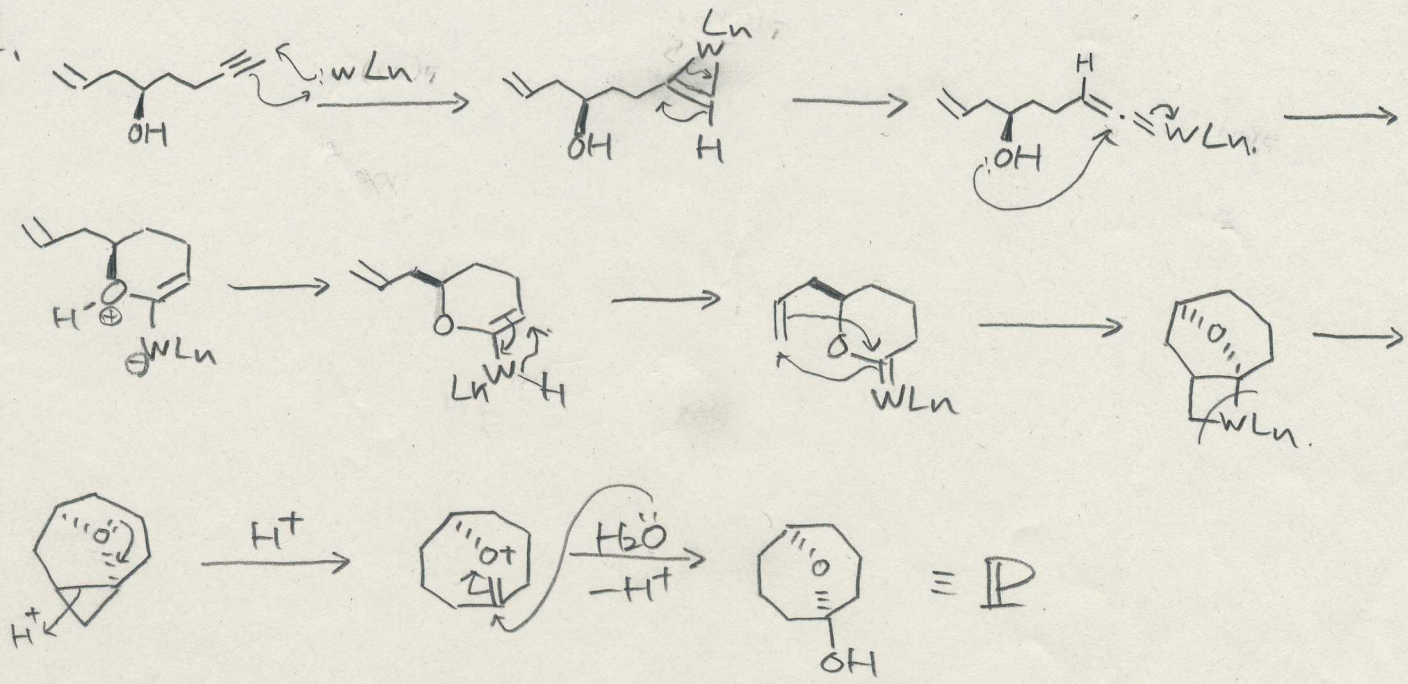
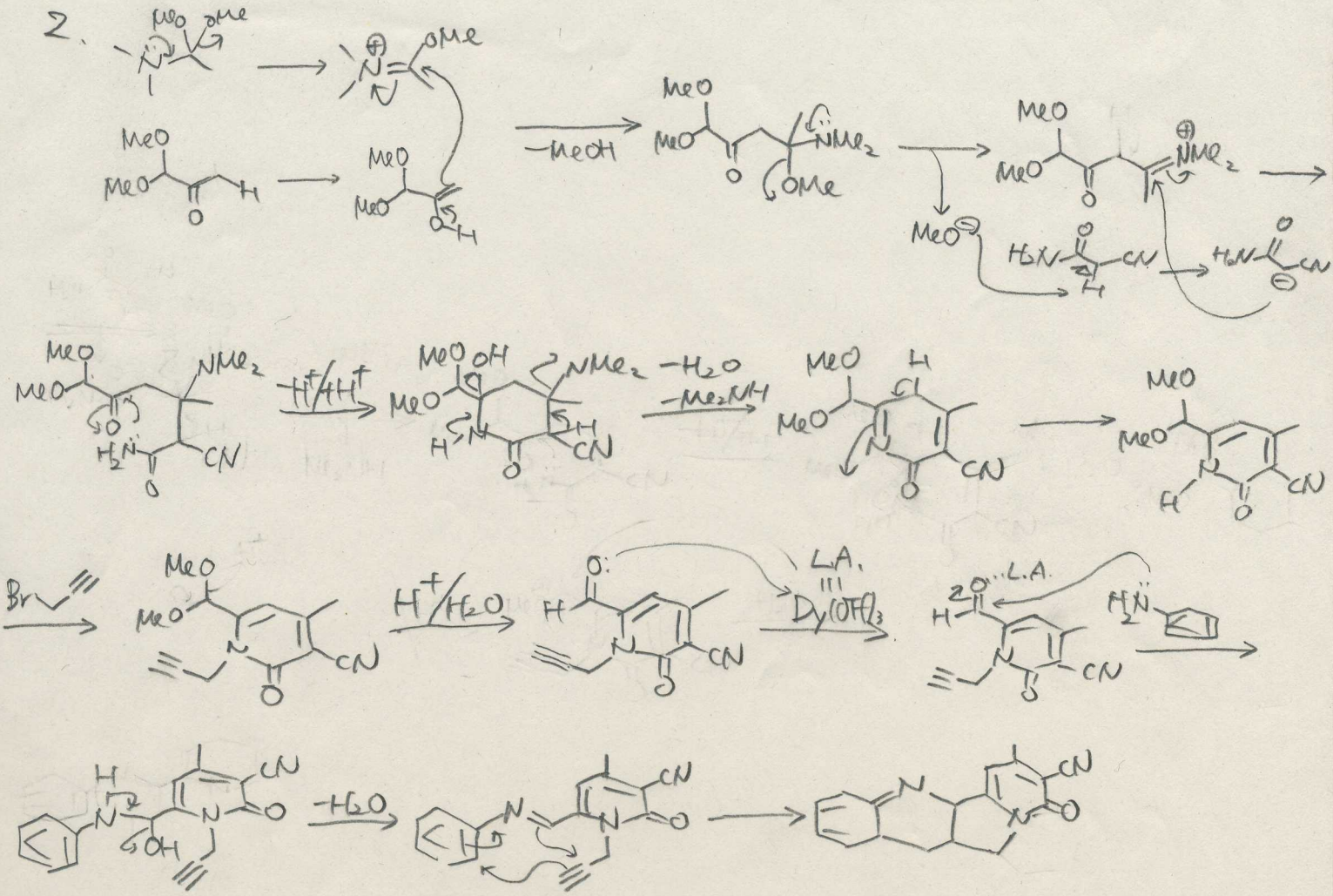
1.



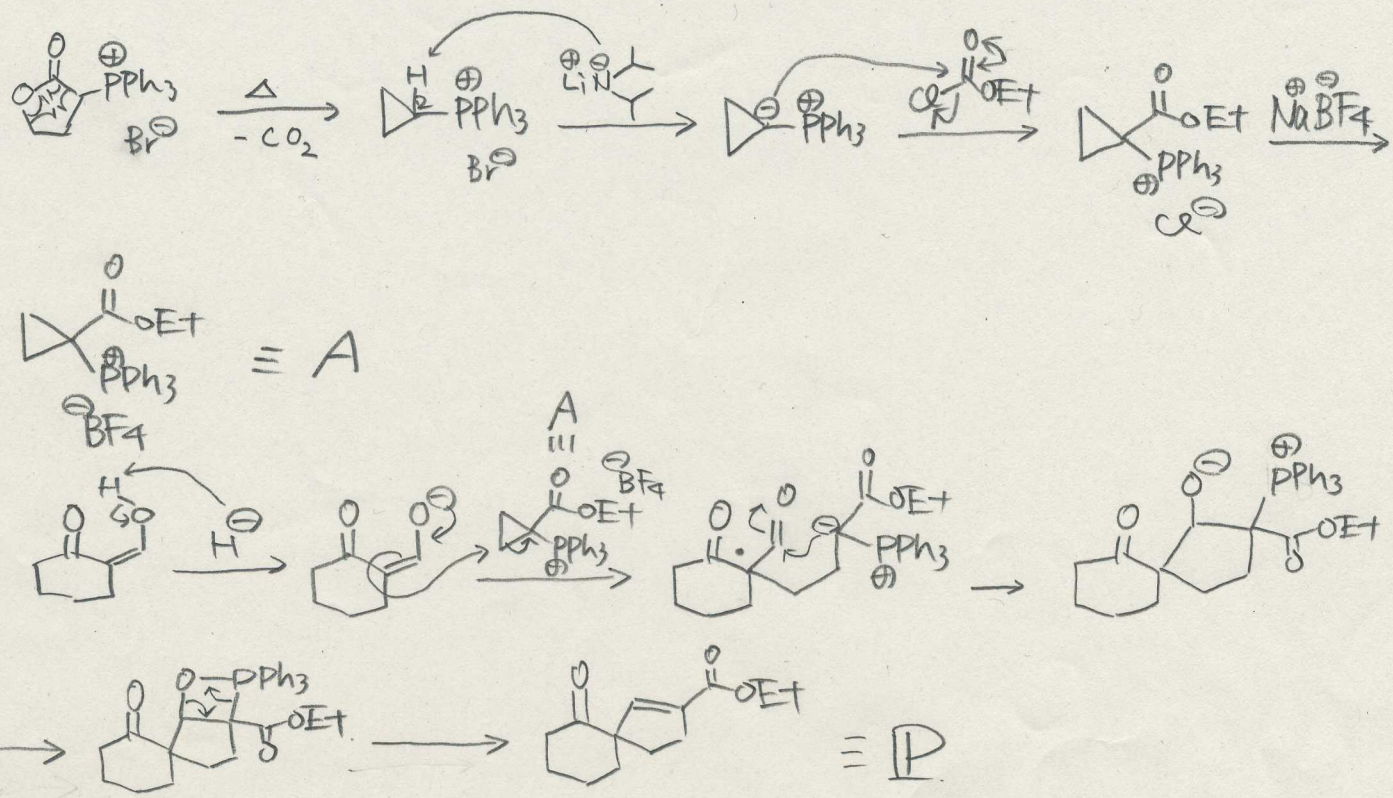
wLn
OH
Ln
W
H
WLn
H⁺
H₂O
−H⁺
≡ P

2.



MeO
OMe
−MeOH
NMe₂
H₂N
CN
−H⁺/+H⁺
−H₂O
−Me₂NH
Br
H⁺/H₂O
L.A.
Dy(OH)₃
−H₂O

3.



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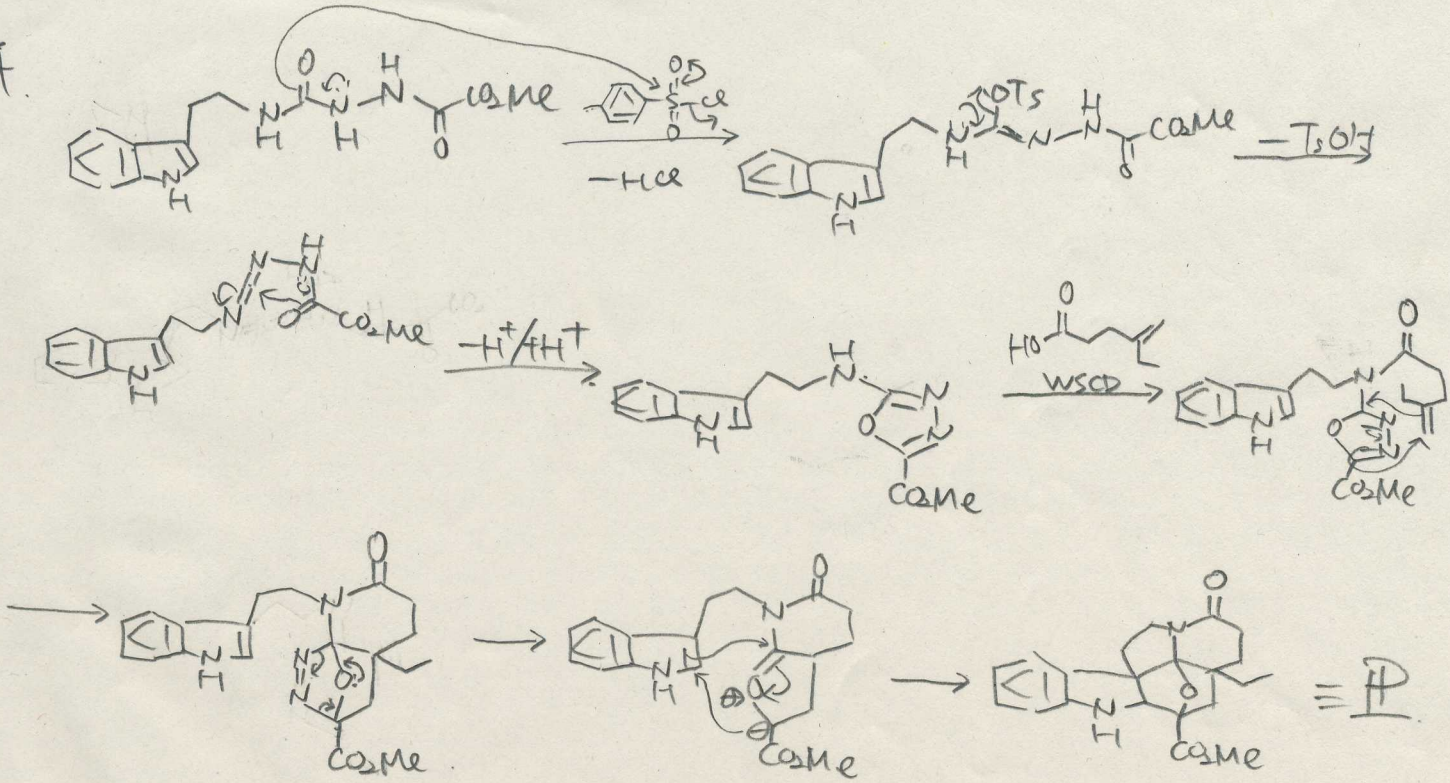

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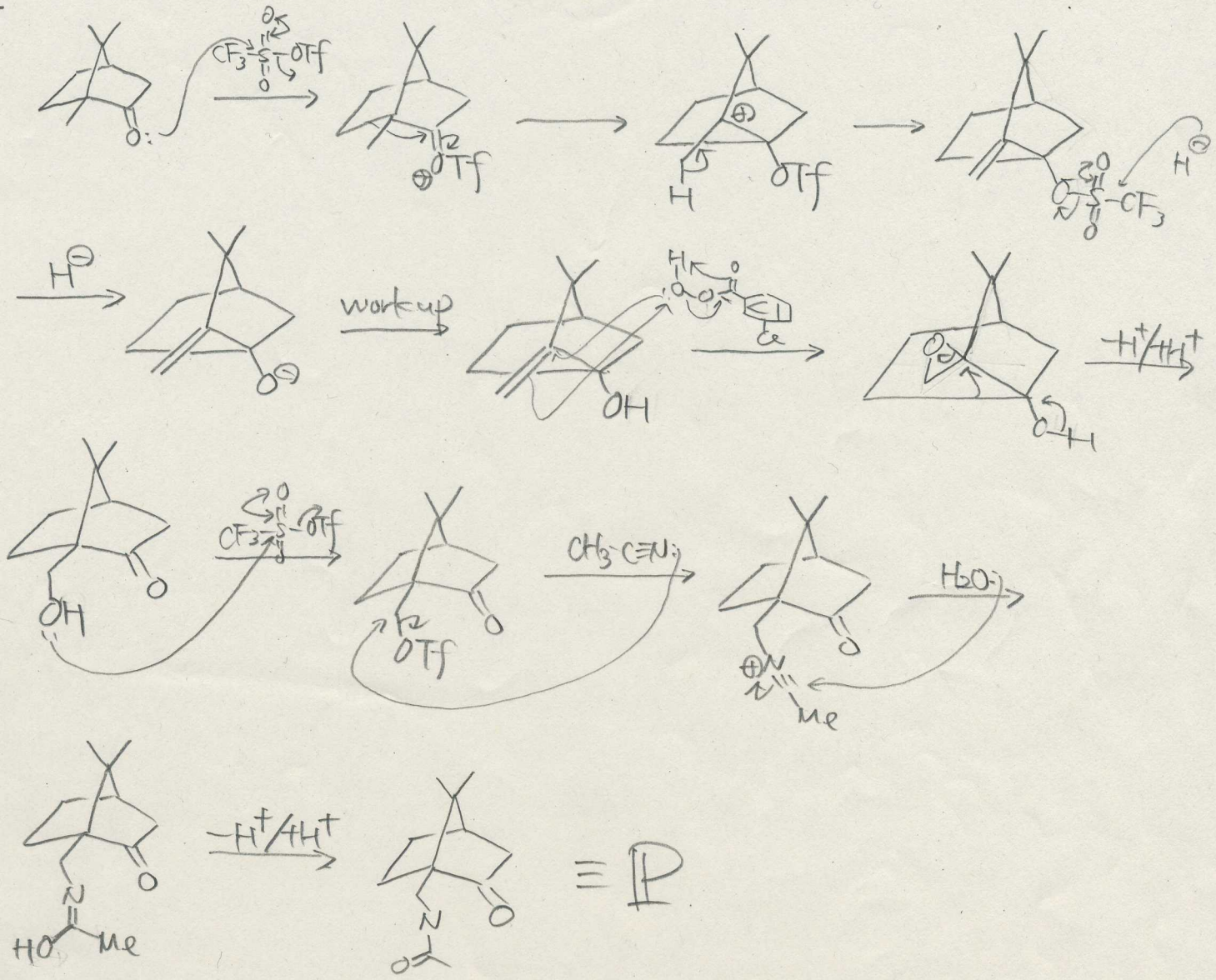

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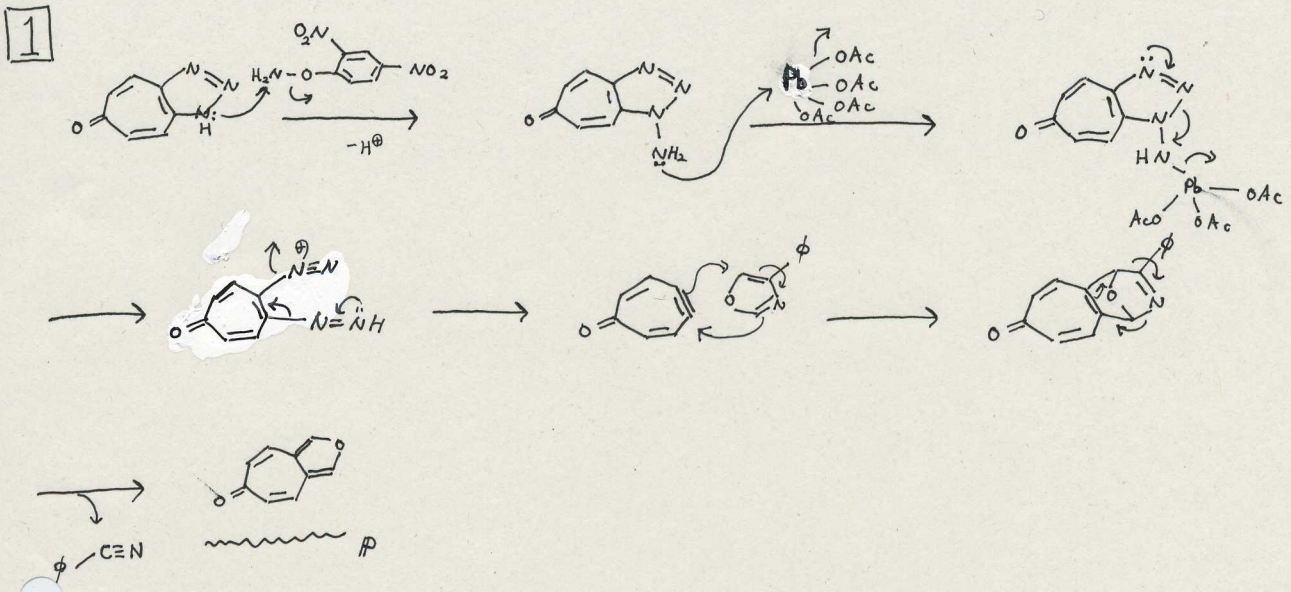

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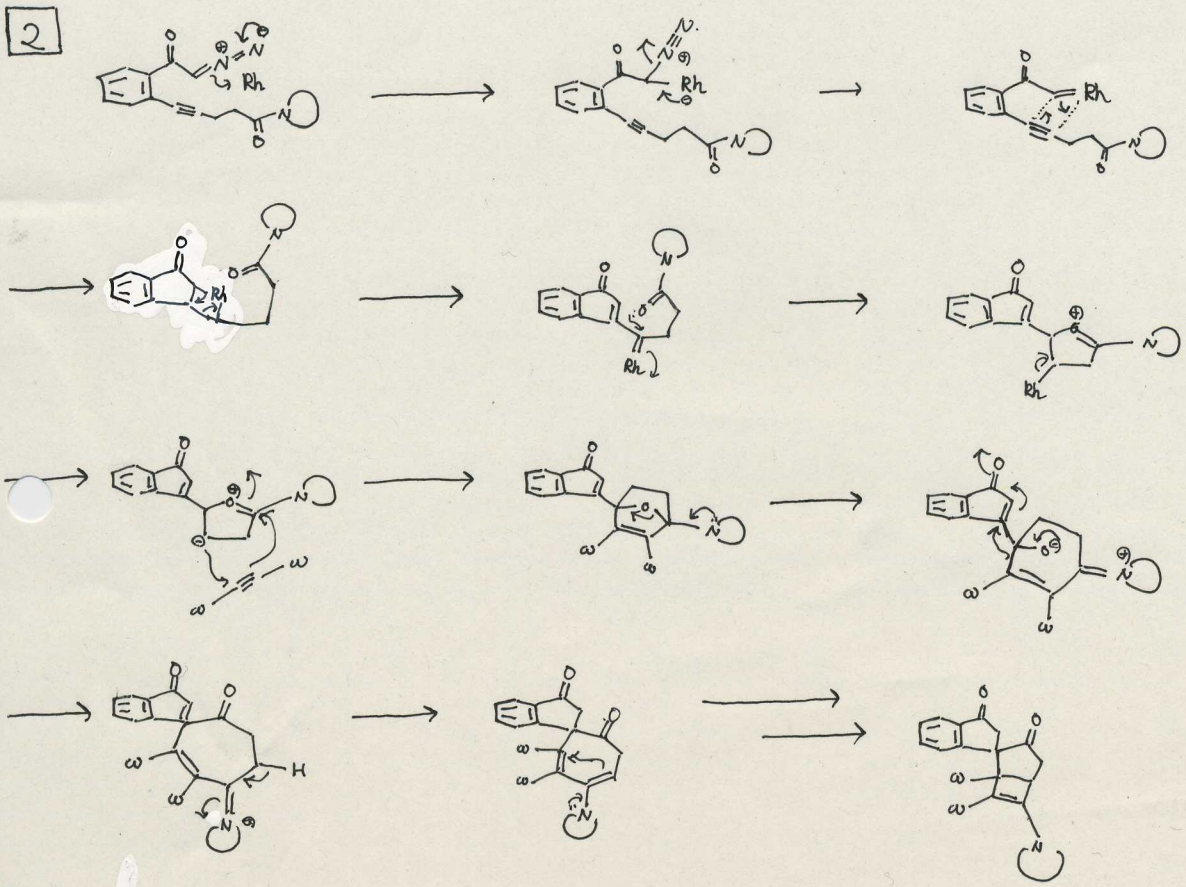

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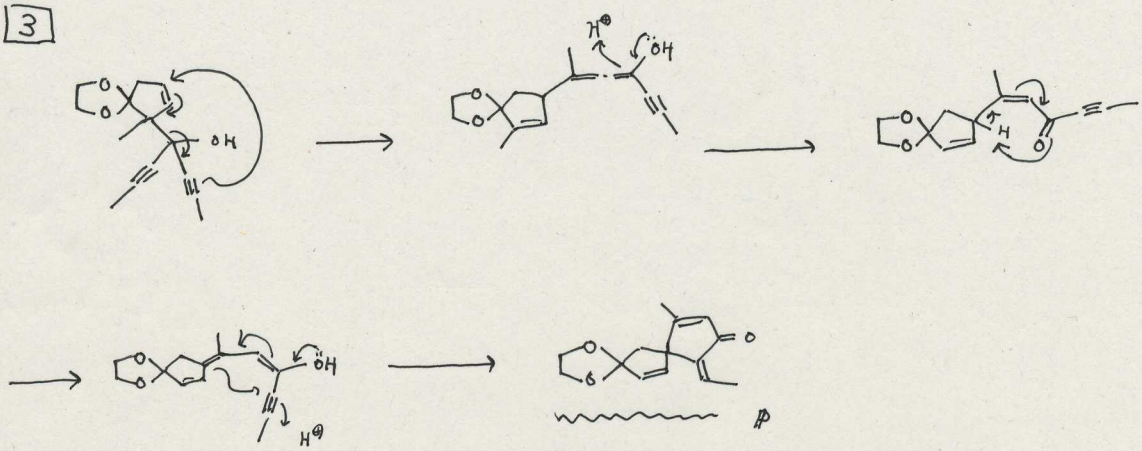

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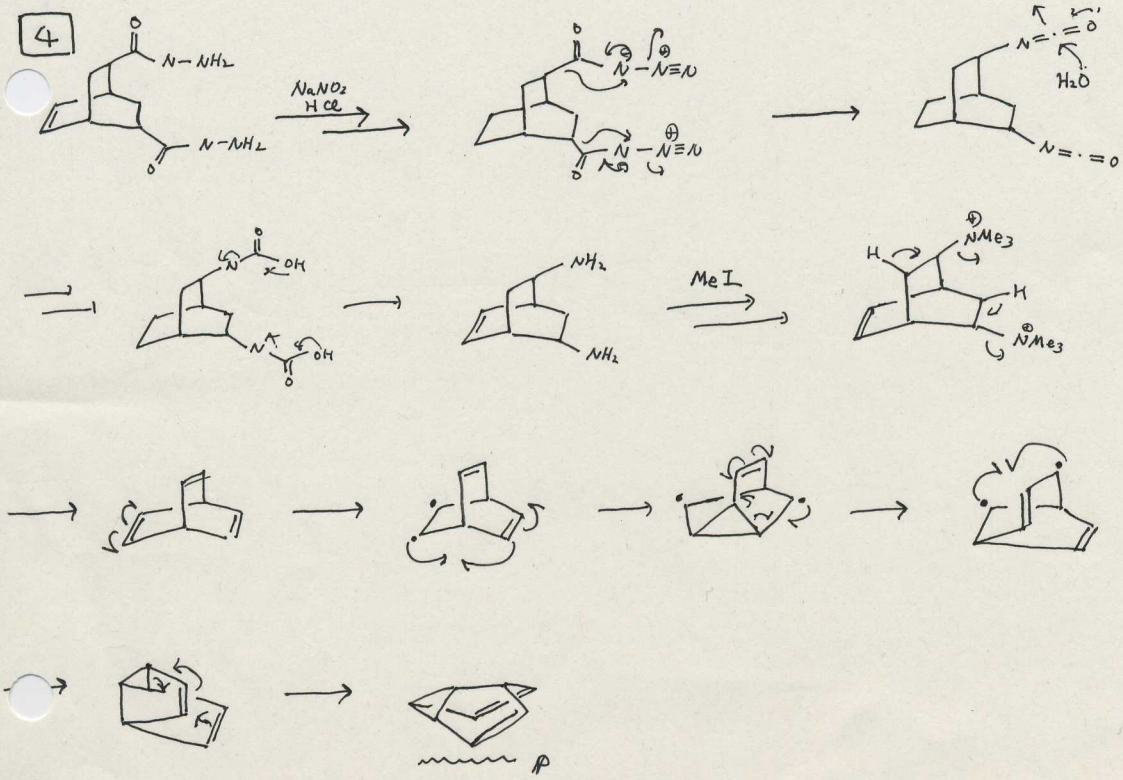

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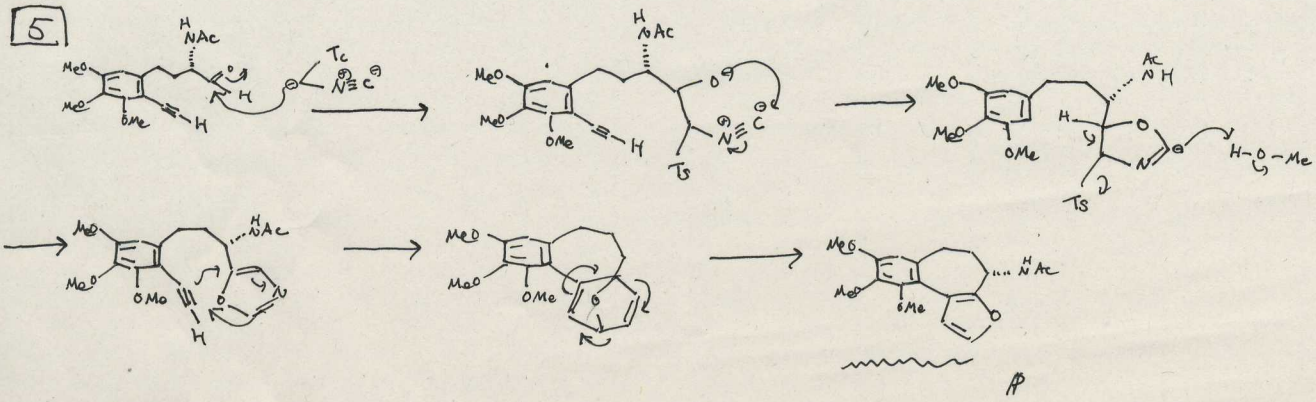
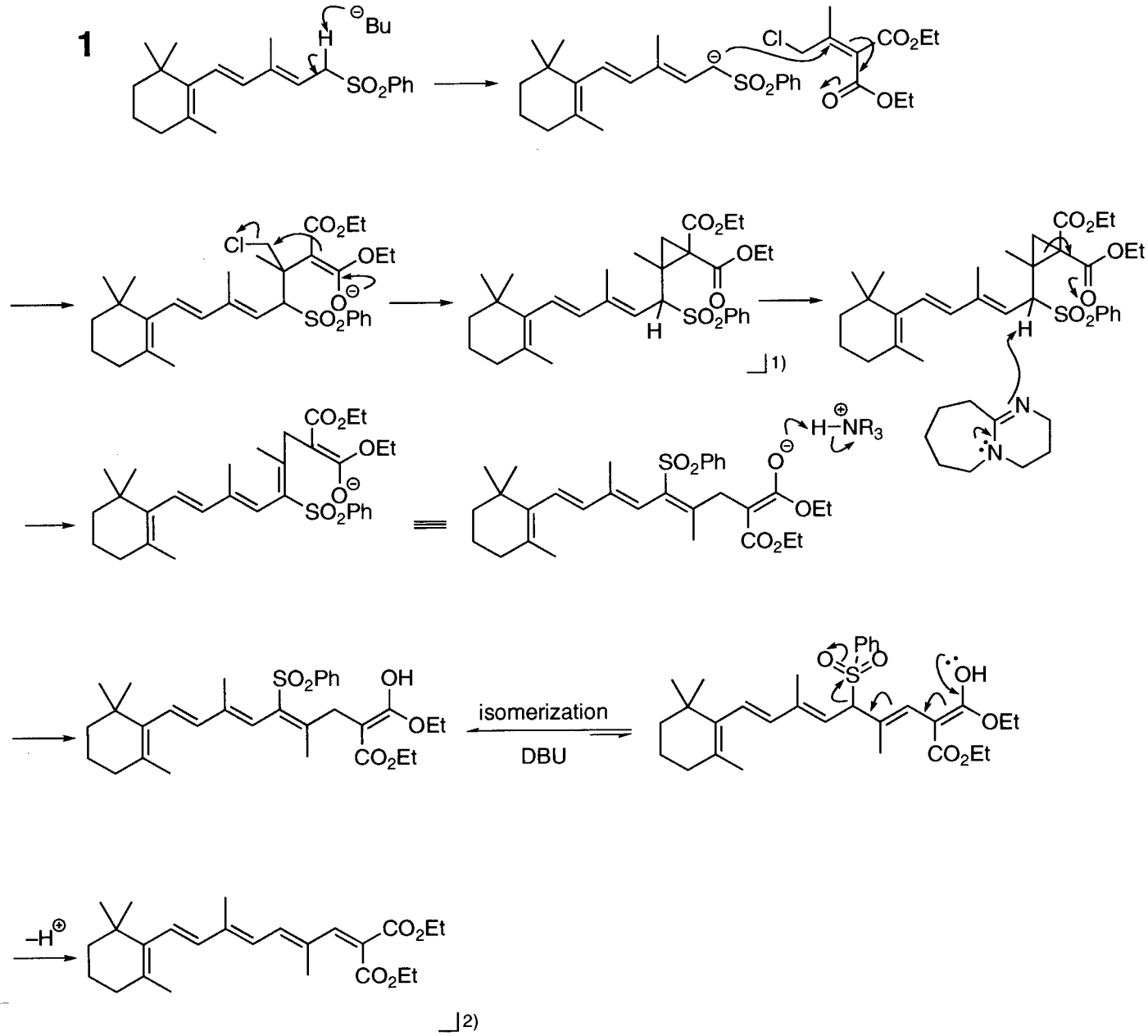


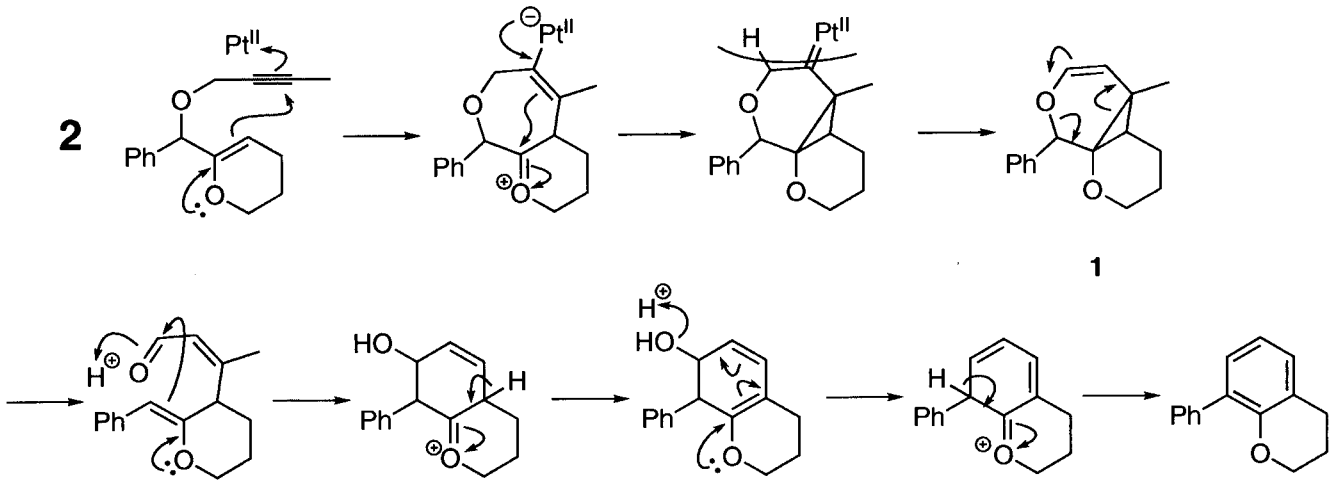
HT

1

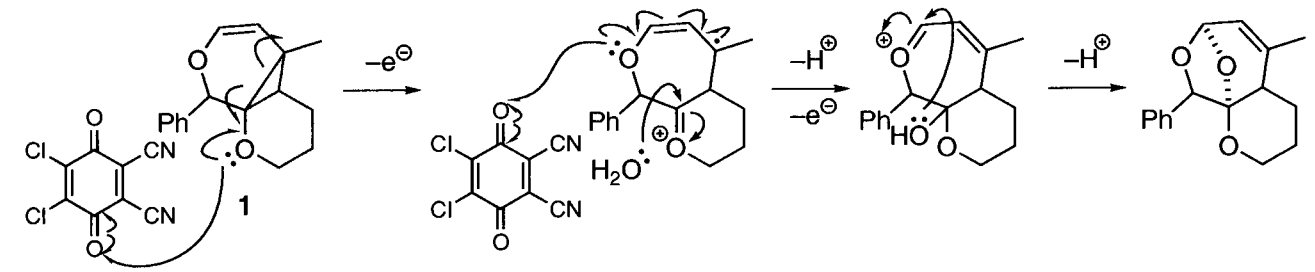


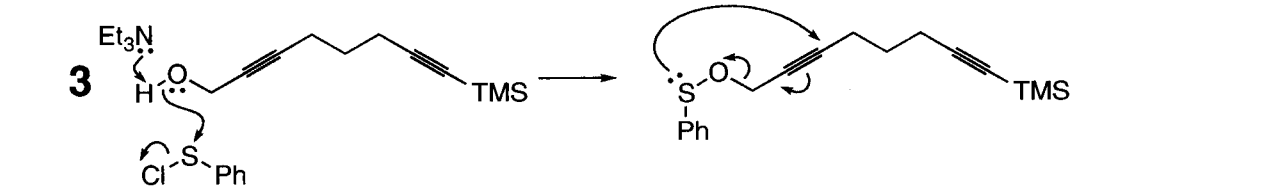
Bu
H
SO2Ph
Cl
CO2Et
OEt
O
H
N
H–NR3
isomerization
DBU
OH
–H⊕
1)
2)

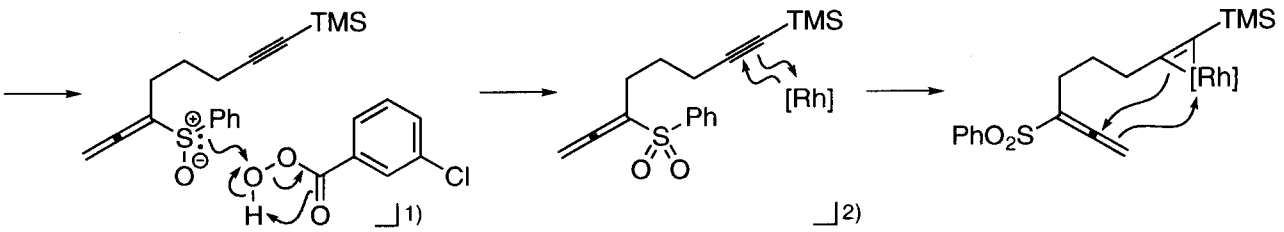
2

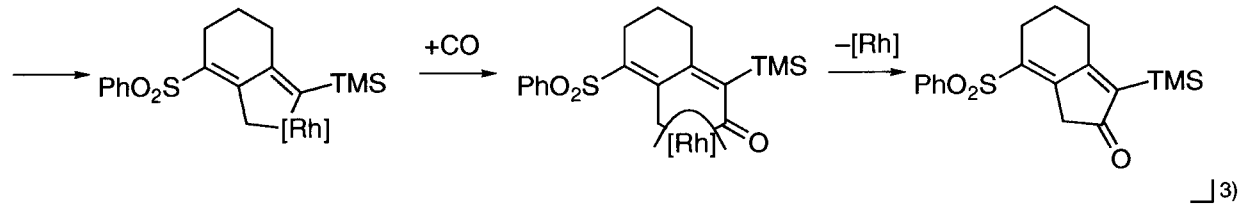


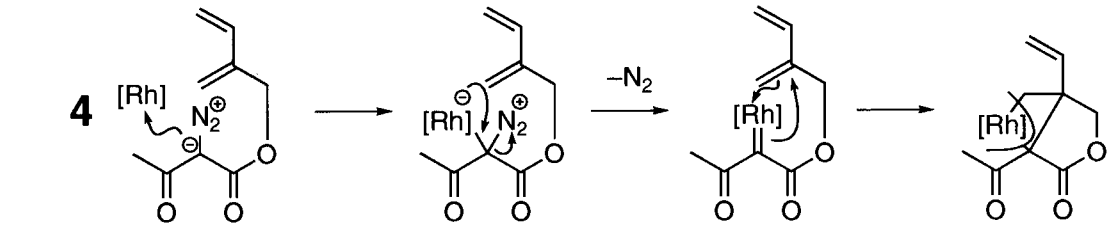
PtII
Ph
O
H
HO
1

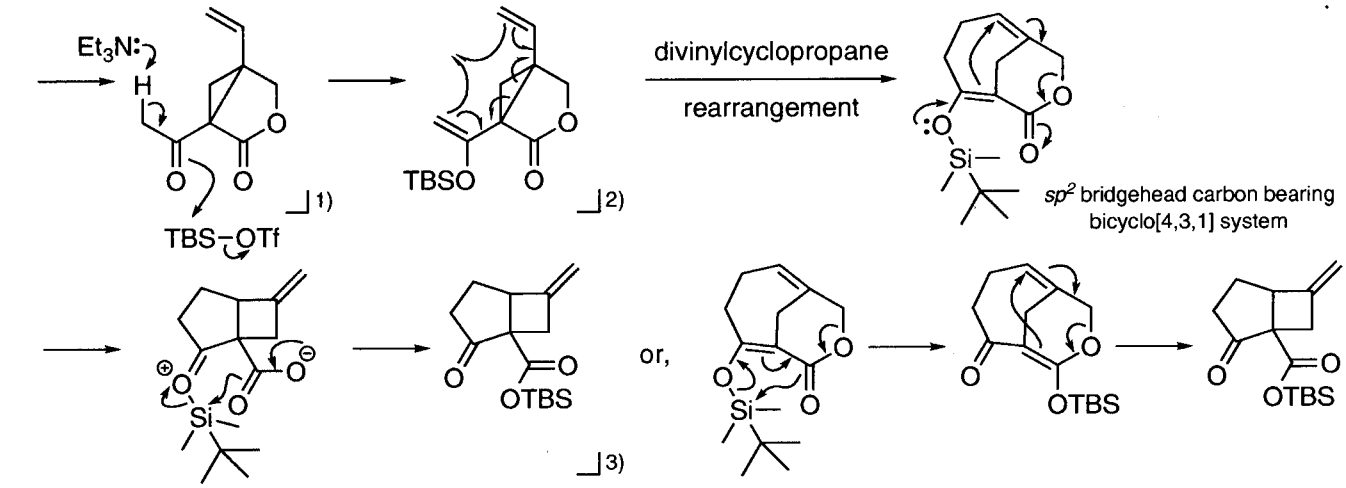
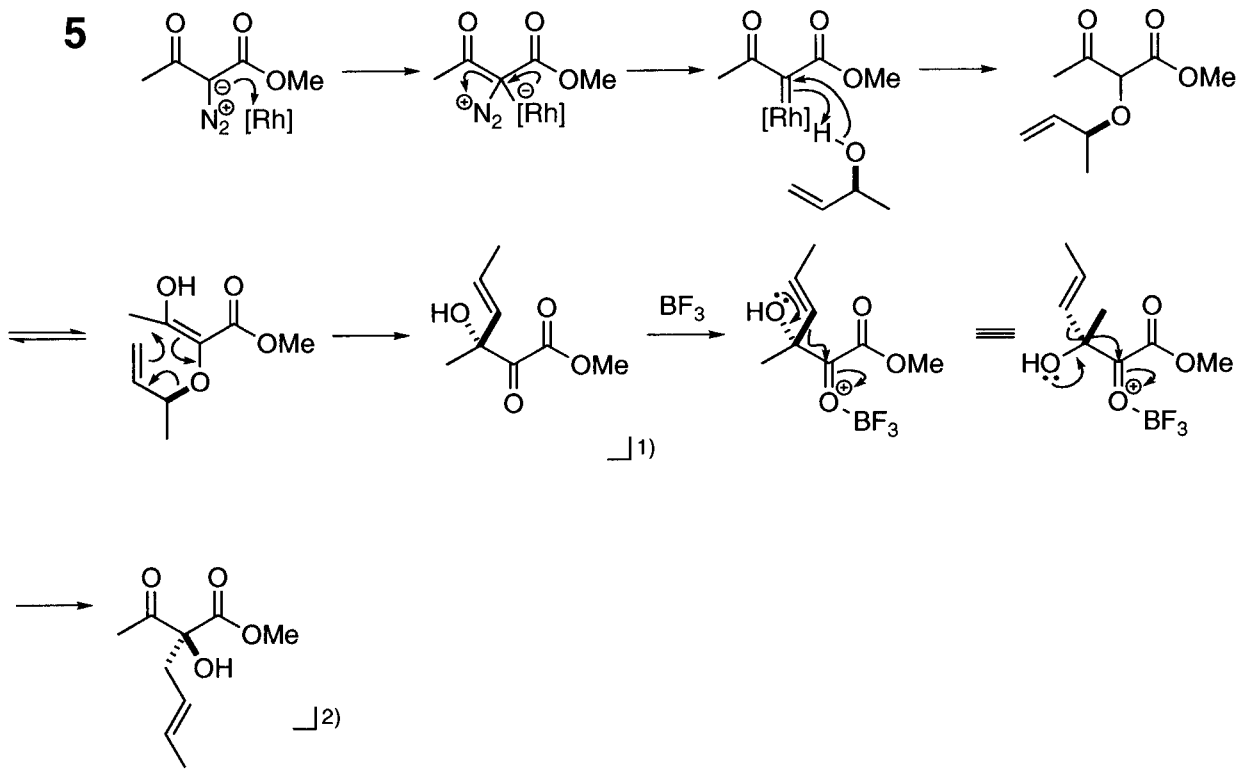

1
−e⊖
−H⊕
−e⊖
−H⊕
Ph
Cl
CN
H2O
HO


3
Et3N
TMS
Ph
Cl


TMS
Ph
Cl
[Rh]
PhO2S
1)
2)


PhO2S
TMS
[Rh]
+CO
−[Rh]
3)


4
[Rh]
N2
−N2


Et3N:
TBS−OTf
1)
TBSO
2)
divinylcyclopropane
rearrangement
Si
sp2 bridgehead carbon bearing
bicyclo[4,3,1] system
OTBS
3)
or,

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