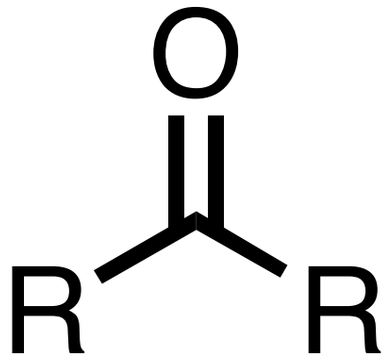
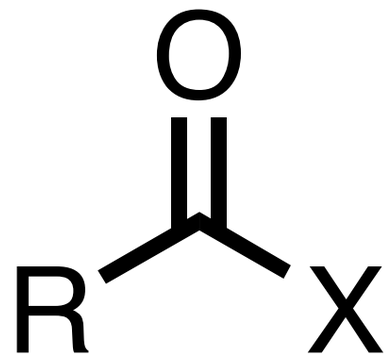
Final Exam
Friday, 12:30 pm
Stevens

~40-50% new material
~50-60% comprehensive

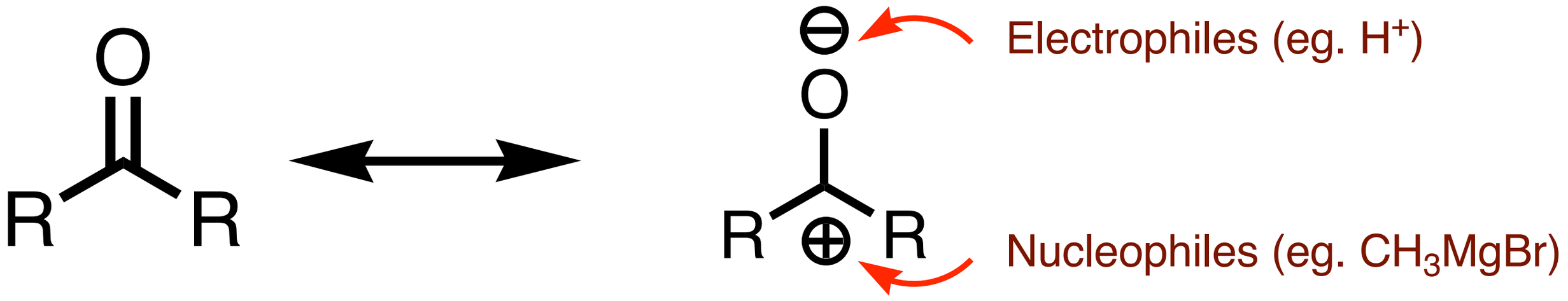
Carbonyl Chemistry



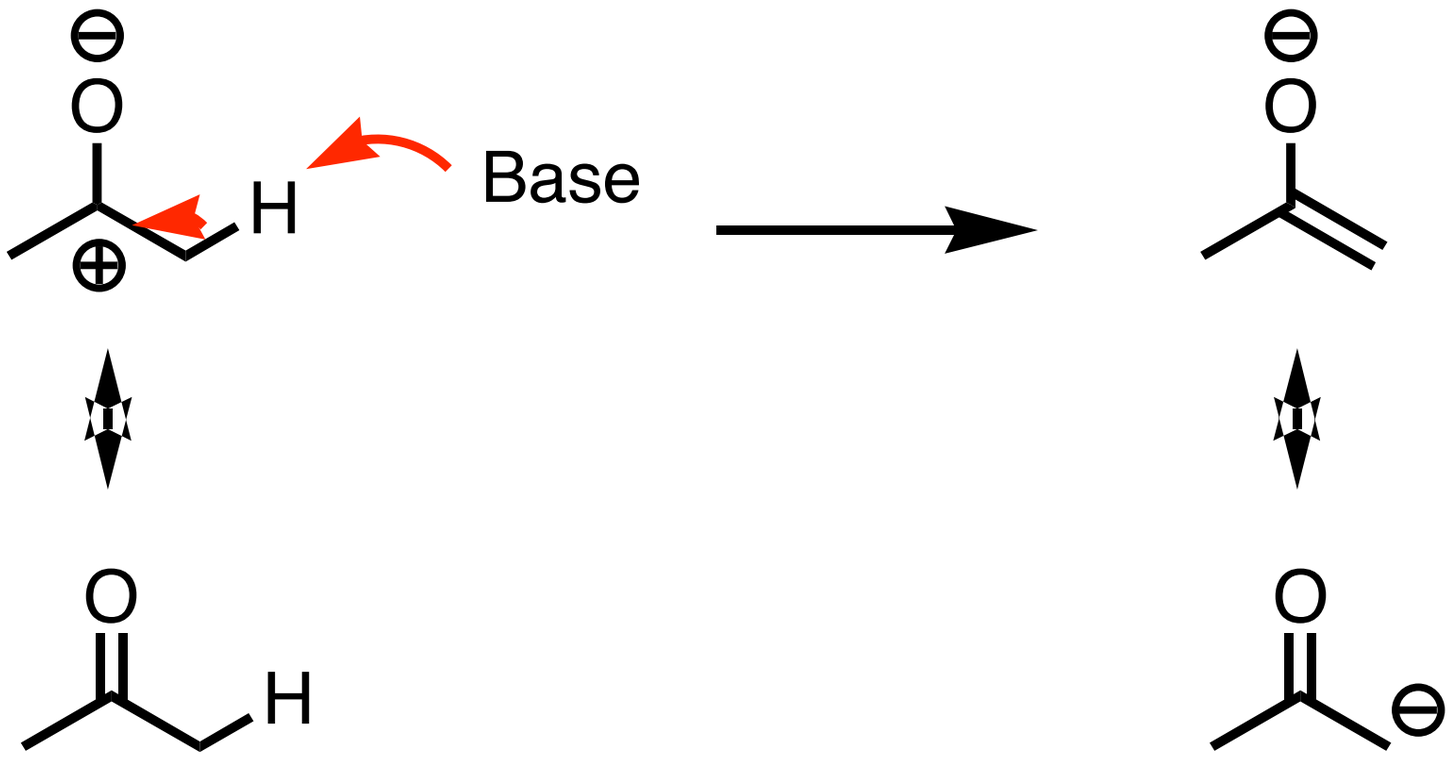
aldehydes
ketones

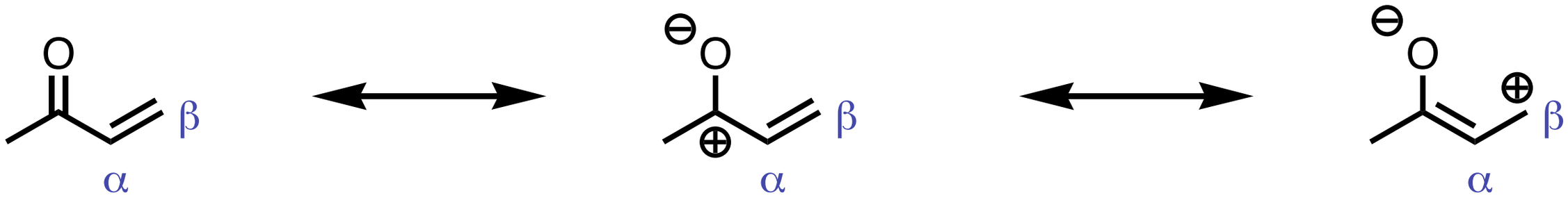


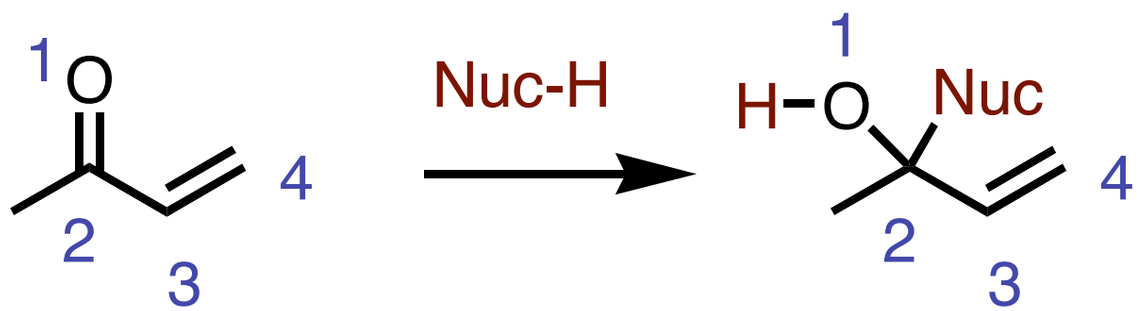
carboxylic acid
and derivatives



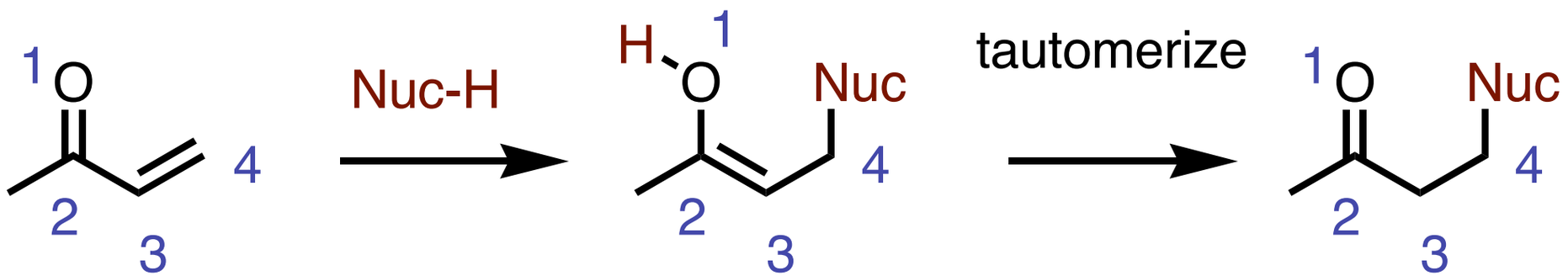
an enolate



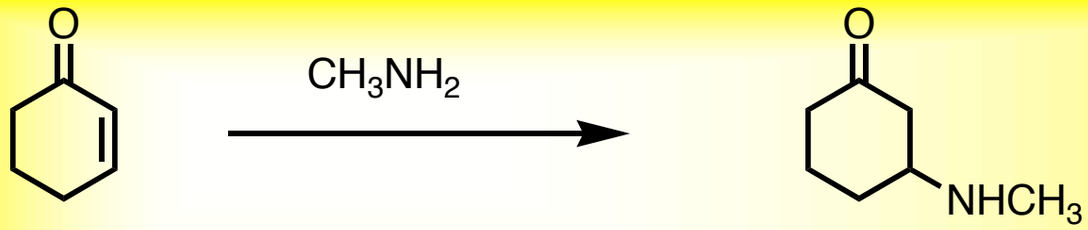




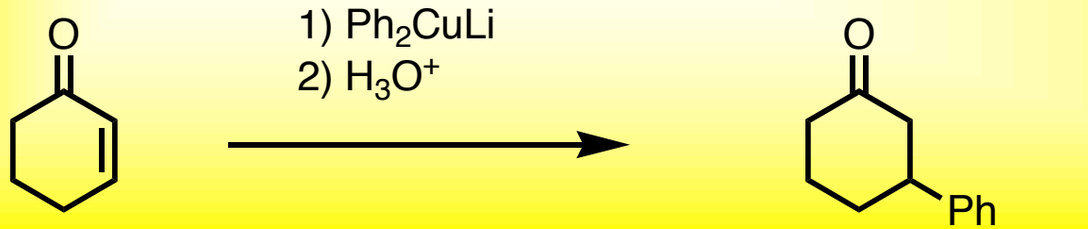
1,2-addition



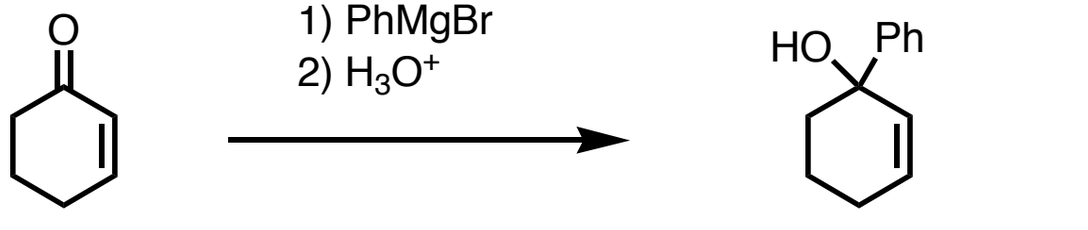
1,4-addition (conjugate addition)



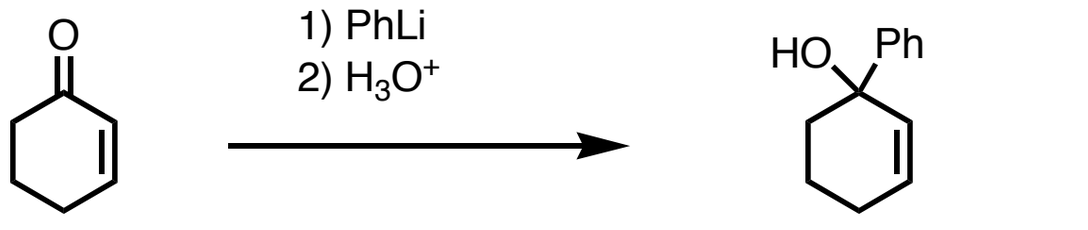
1,4-addition



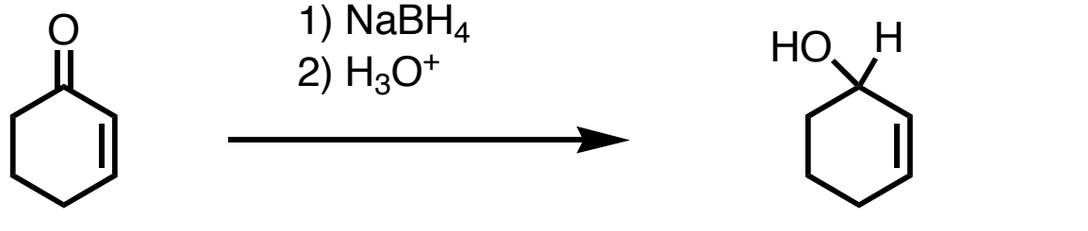
1,4-addition



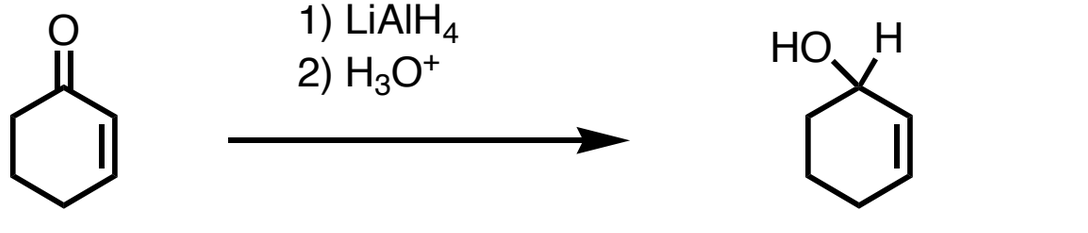
1,2-addition



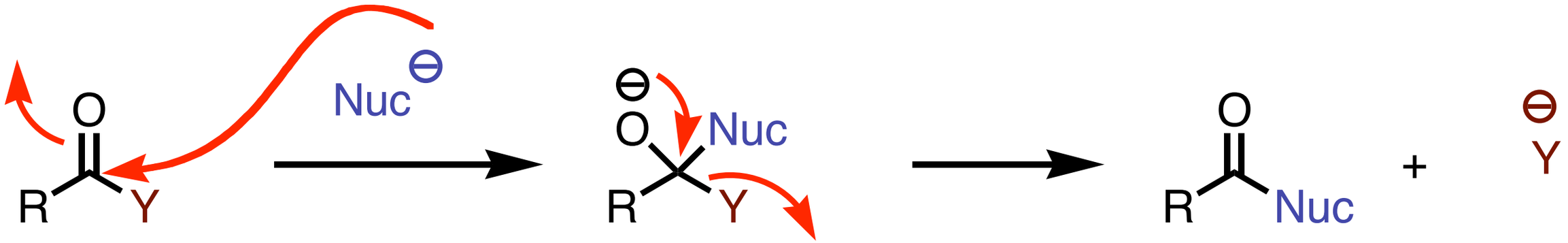
1,2-addition

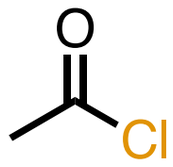


1,2-addition



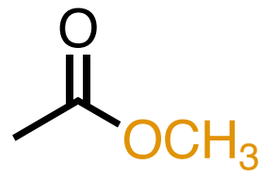
1,2-addition



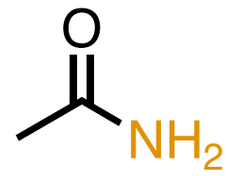


Acid Halides
(acetyl chloride)

Acid anhydrides
(acetic anhydride)

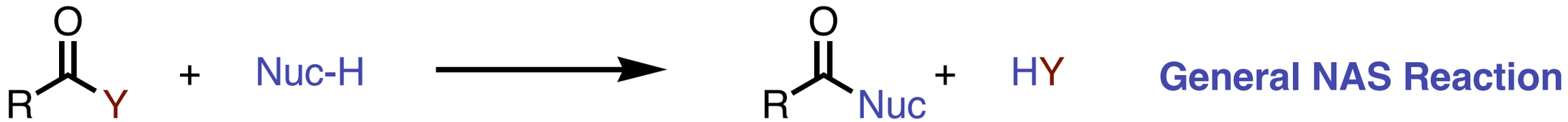


Esters
(methyl acetate)

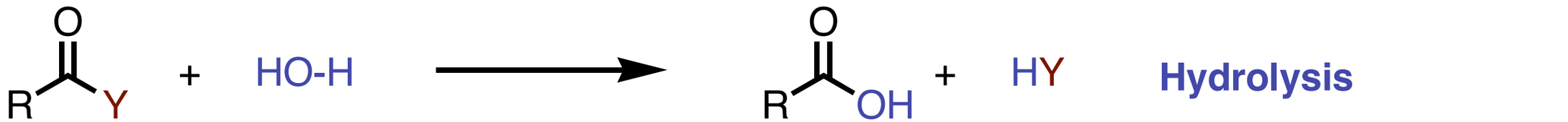


Amides
(acetamide)

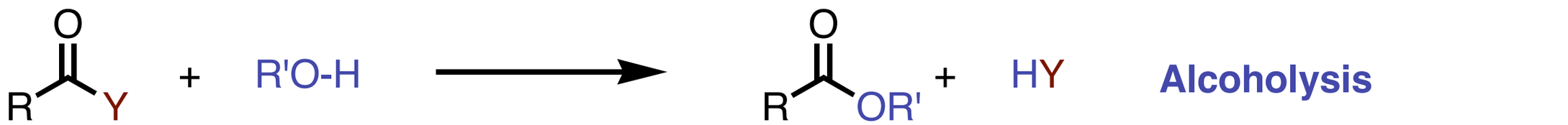
More Reactive → Less Reactive



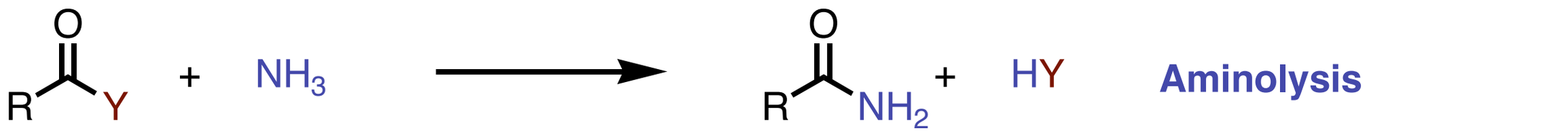
General NAS Reaction



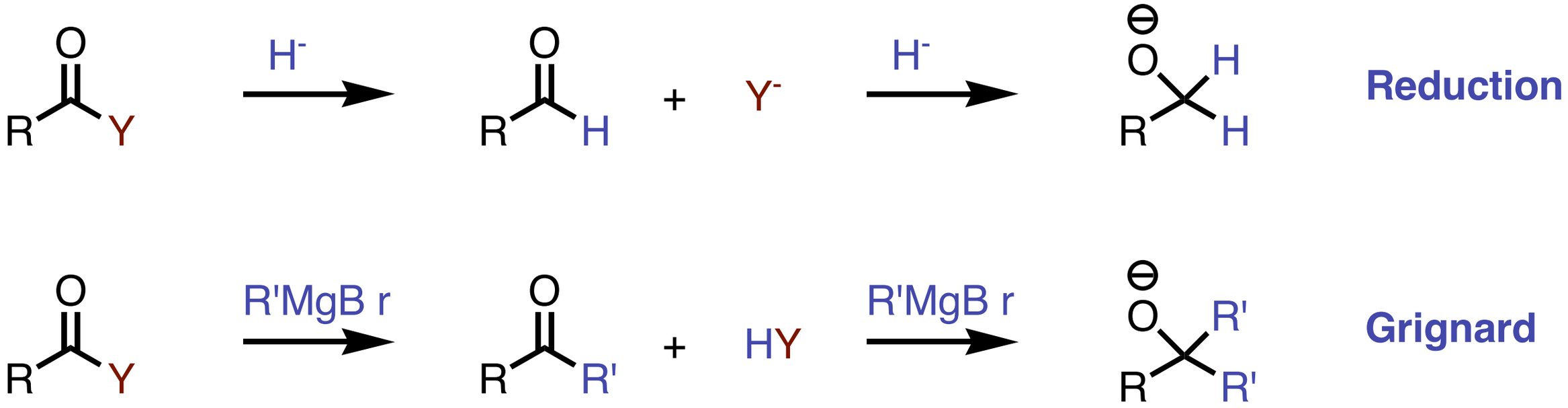
Hydrolysis



Alcoholysis

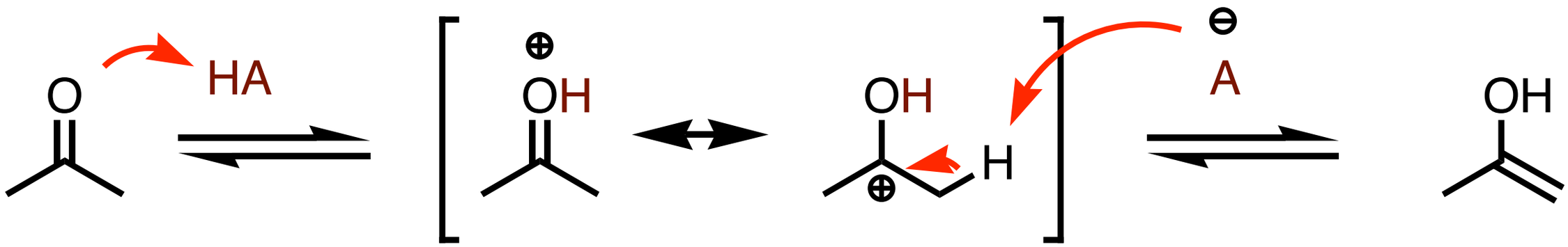


Aminolysis

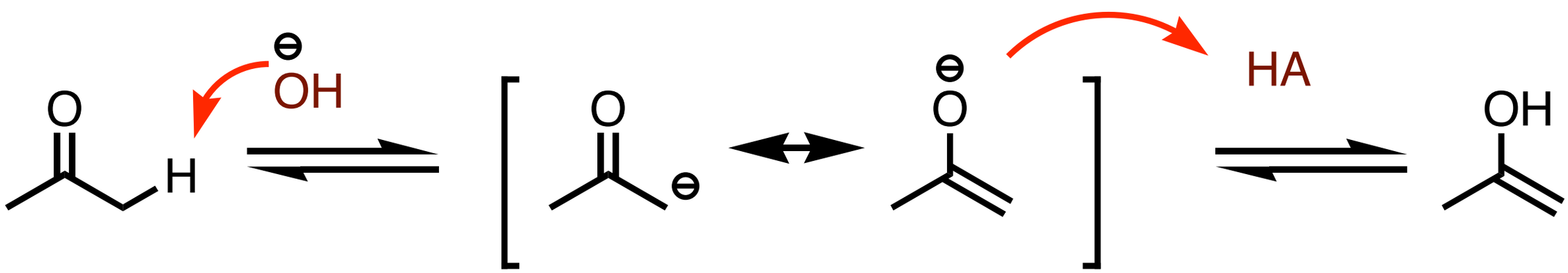

O
R
Y
H-
O
R
H
+
Y-
H-
O
H
R
H
Reduction
R'MgB r
R'
HY
R'MgB r
R'
R'
Grignard

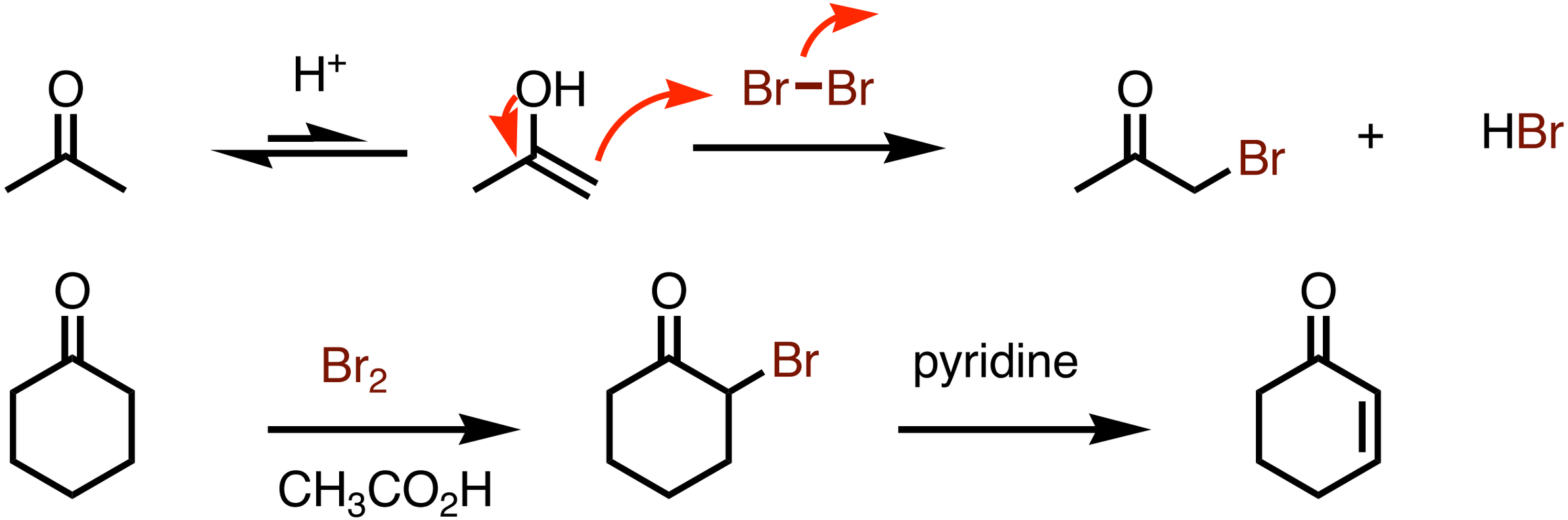

O
R
Cl
R'2CuLi
O
R
R'
O
R
OCH3
DIBAL
O
R
H

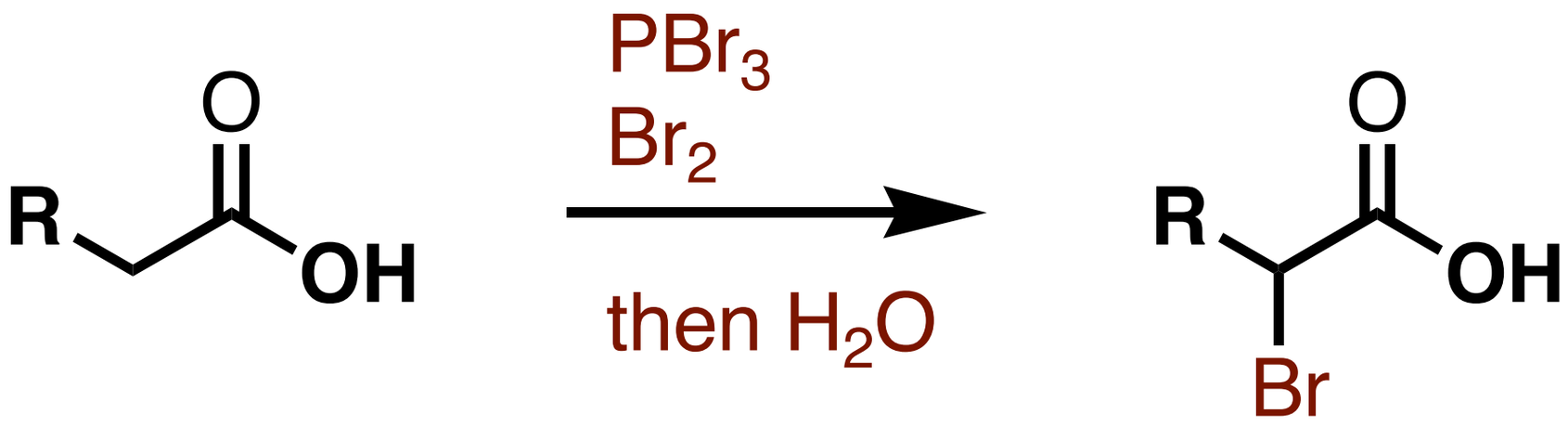
Acid Catalyzed Enol Equilibrium



Base Catalyzed Enol Equilibrium

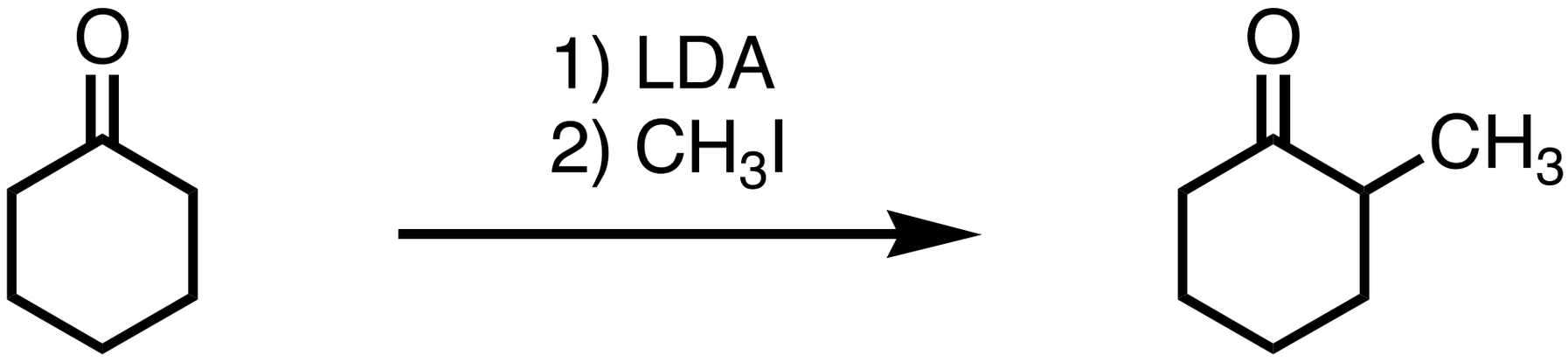


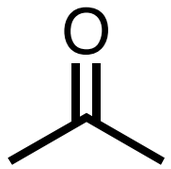

O
H+
OH
Br–Br
O
Br
+
HBr
O
Br2
CH3CO2H
O
Br
pyridine
O


R
O
OH
PBr3
Br2
then H2O
R
O
OH
Br

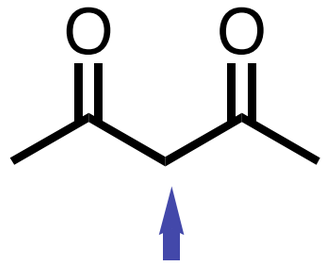
LDA
lithium
diisopropyl
amide

100%

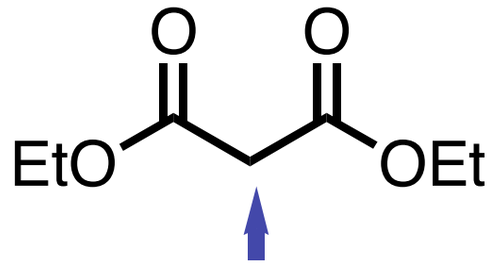




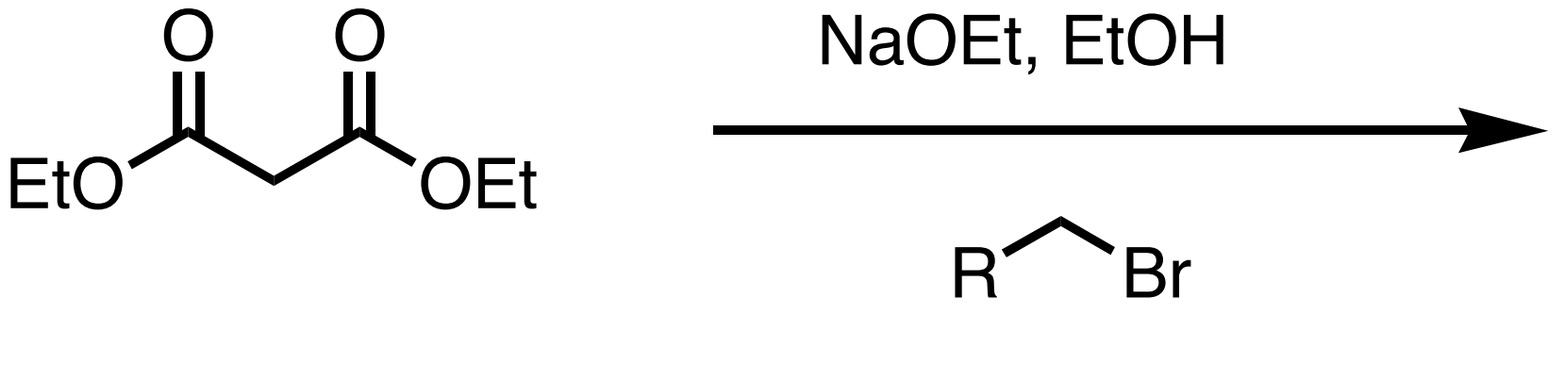
$pK_a = 20$

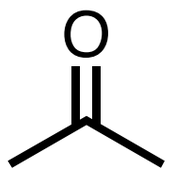


$pK_a = 9$

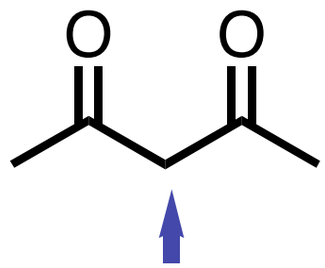


$pK_a = 13$

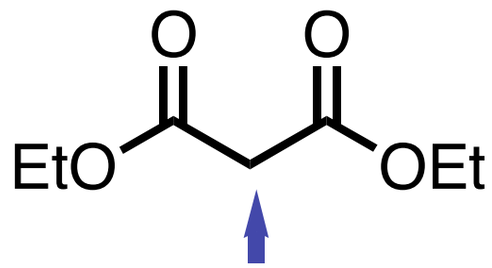




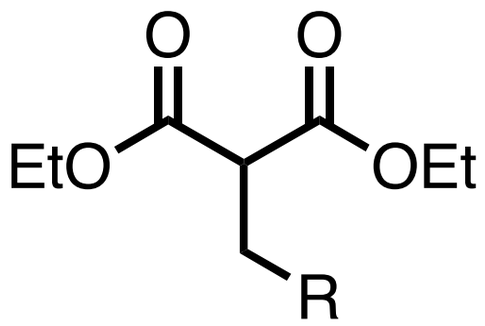
$pK_a = 20$



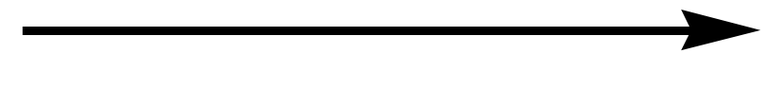
$pK_a = 9$

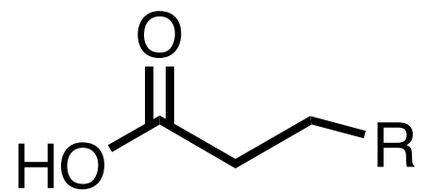


$pK_a = 13$



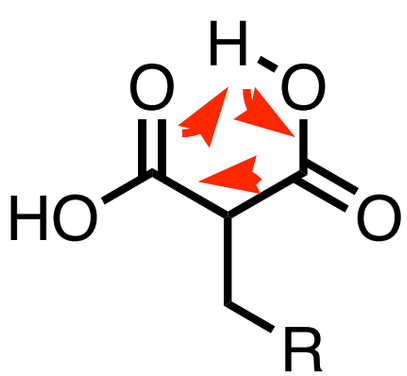
H_3O^+, Heat





+ CO_2

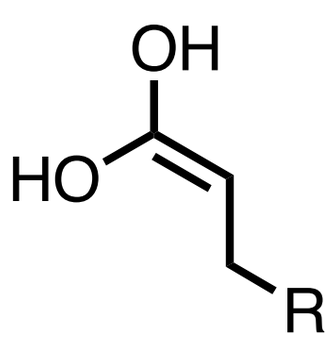
H_3O^+

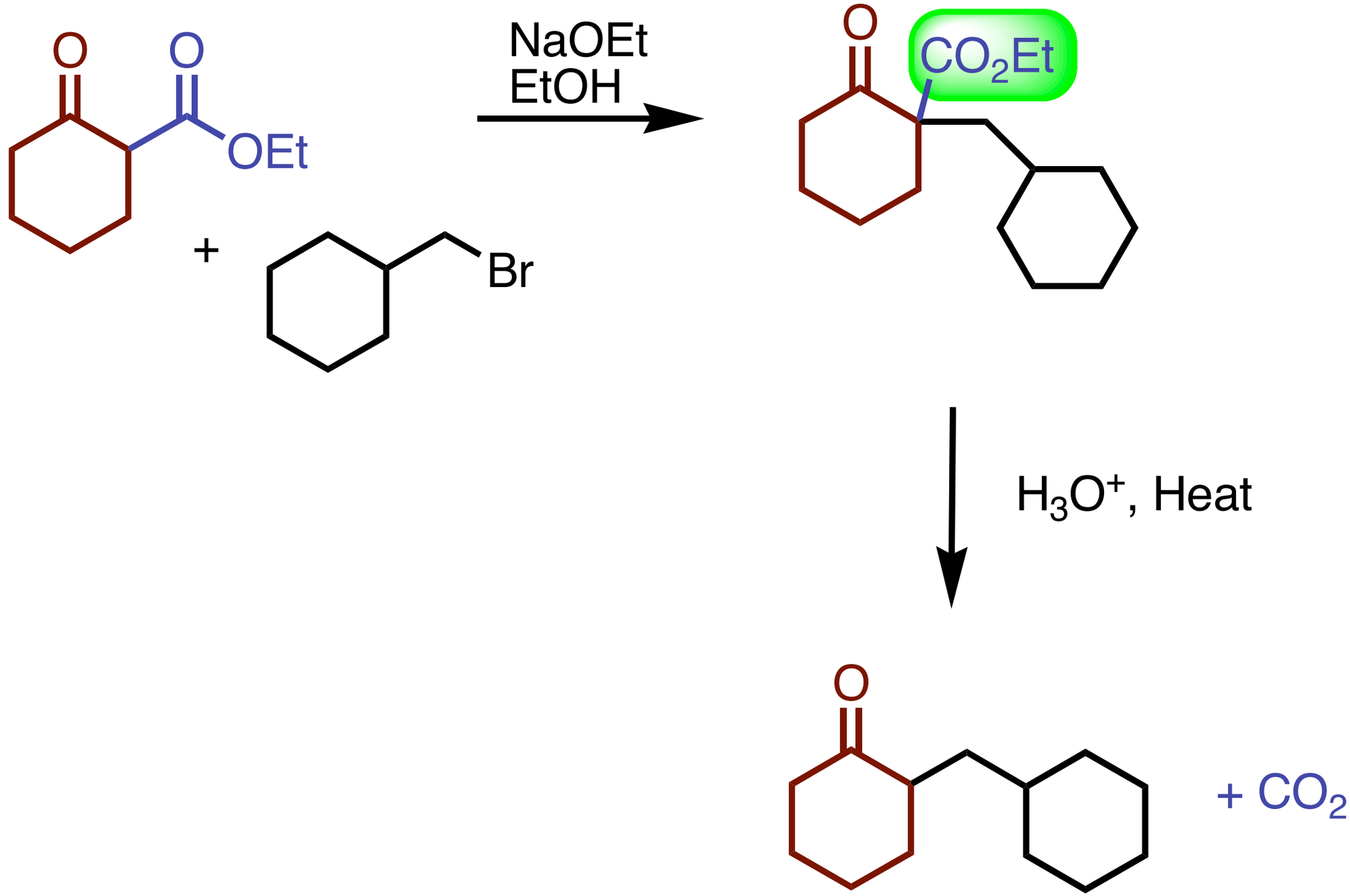


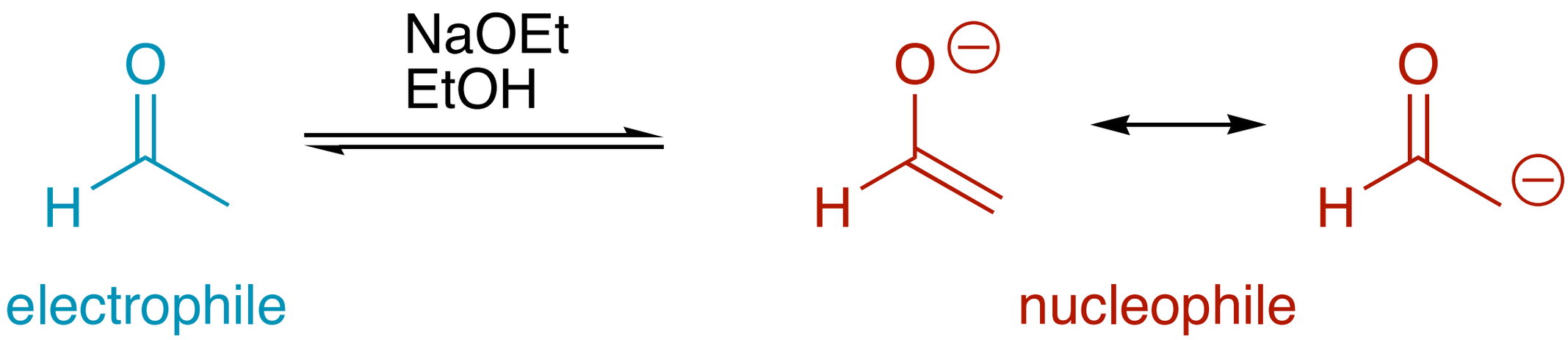
Heat

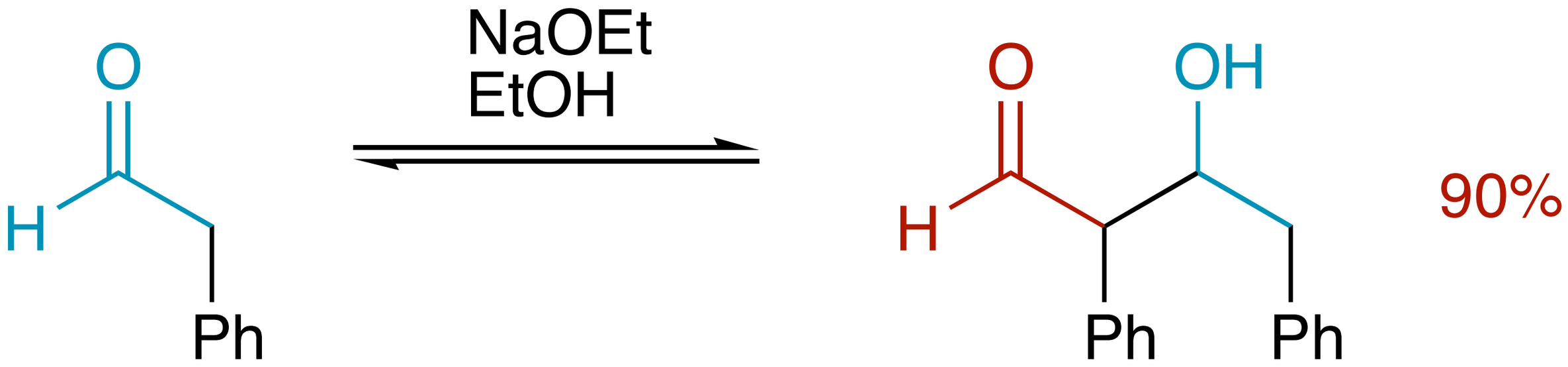
$-CO_2$

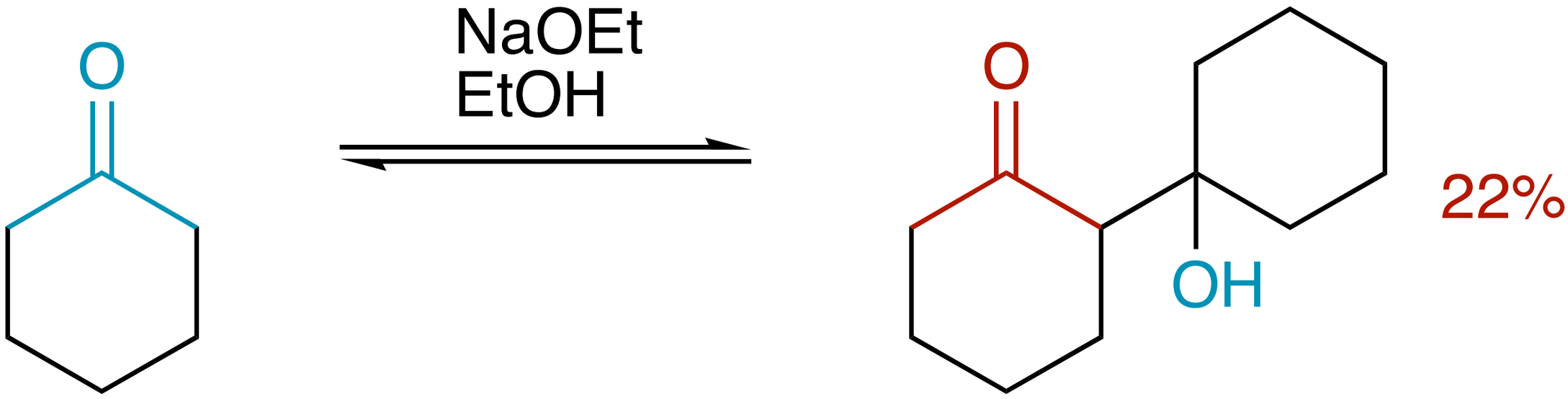
tautomerize

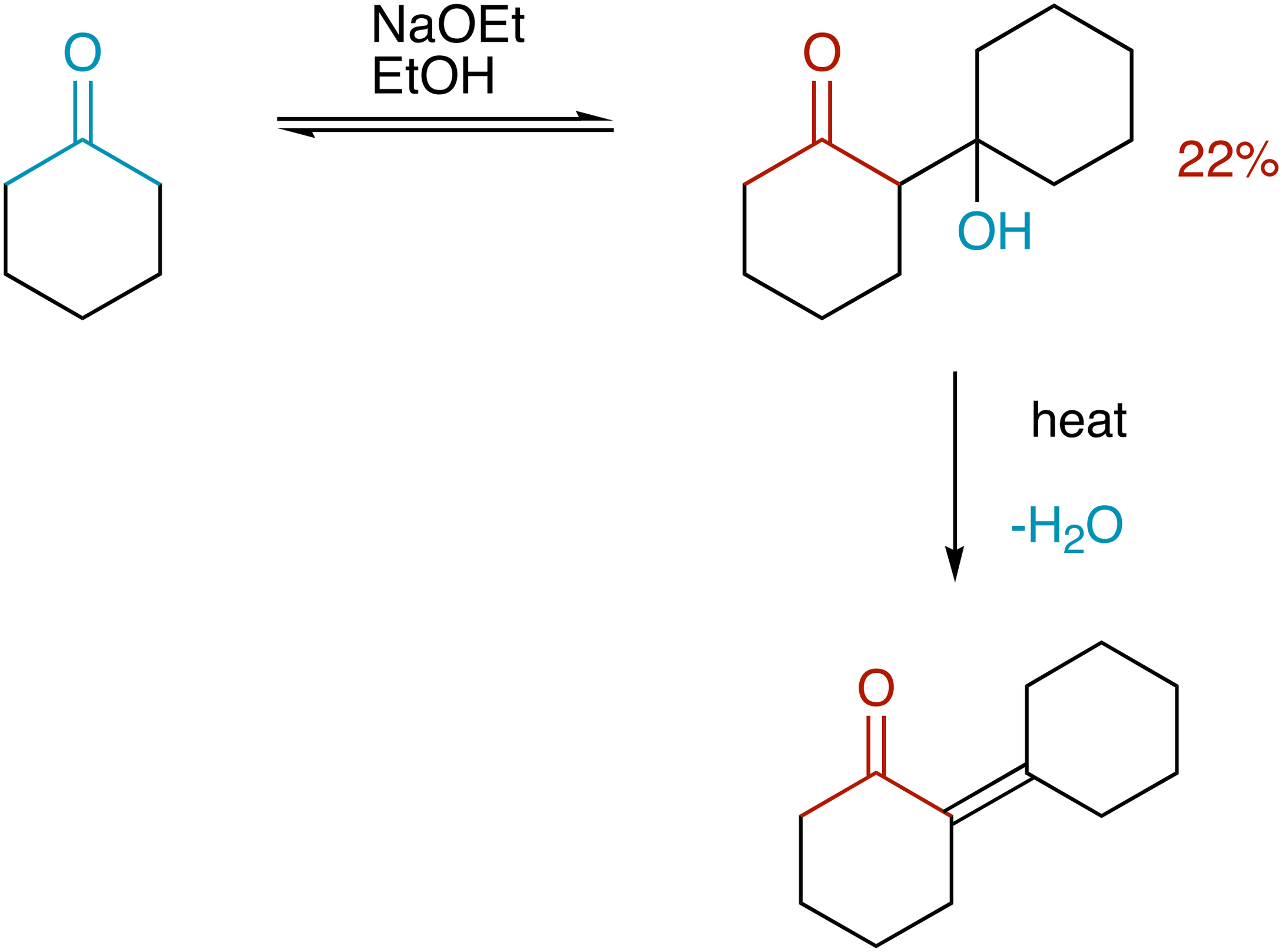


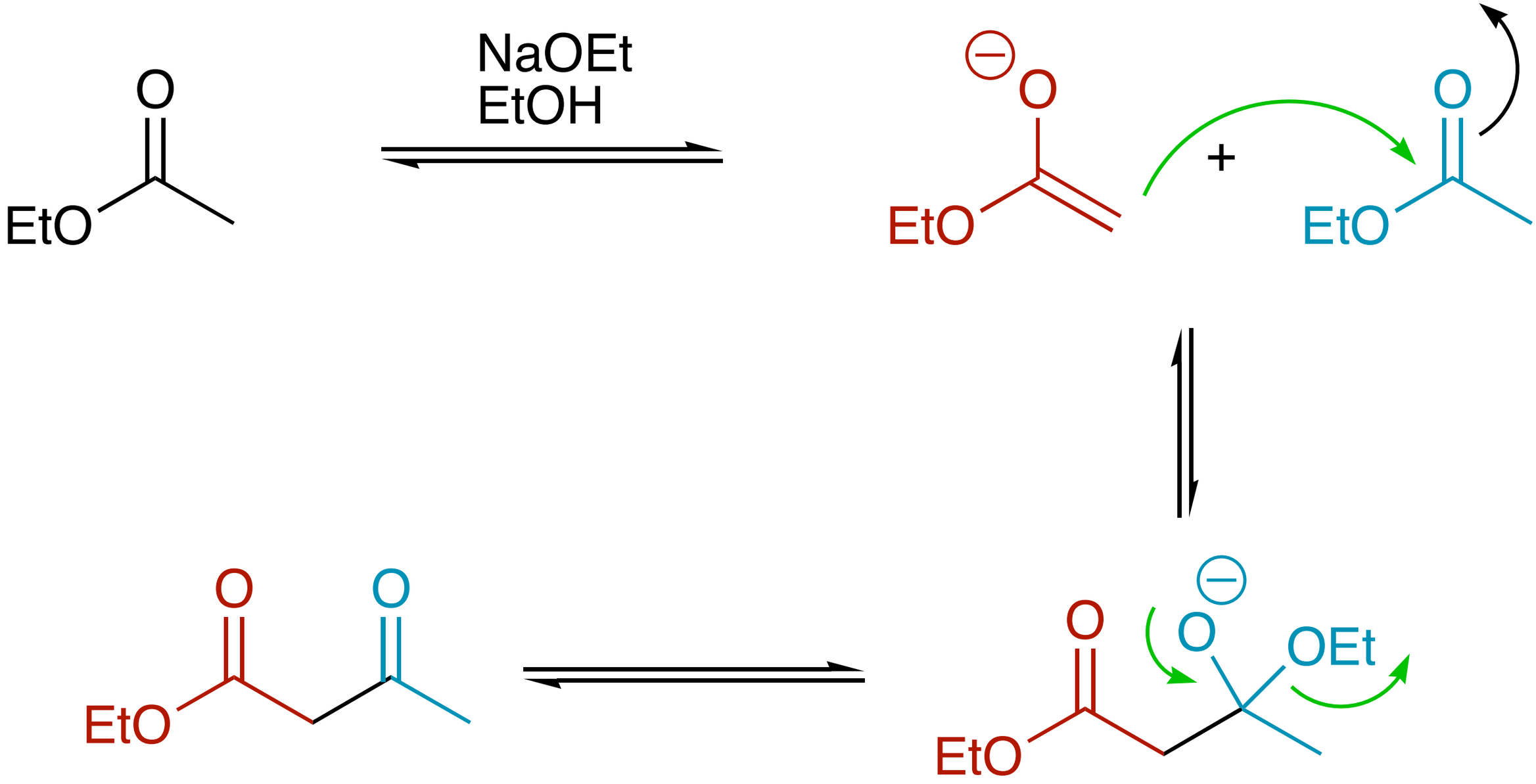

O
O
OEt
+
Br
NaOEt
EtOH
O
CO2Et
H3O+, Heat
O
+ CO2

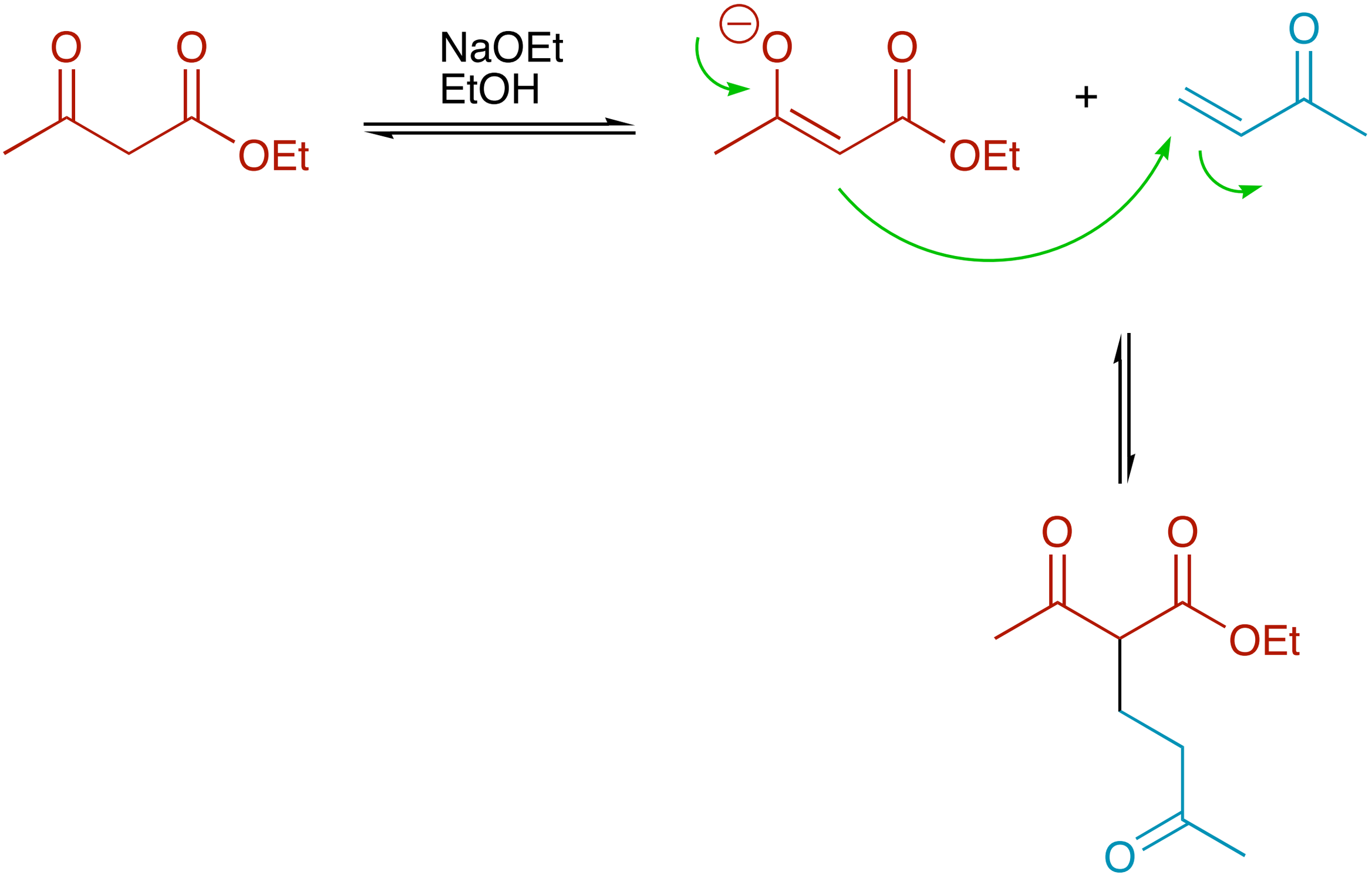

NaOEt
EtOH
O
H
electrophile
O
H
nucleophile
O
H
O
O
H

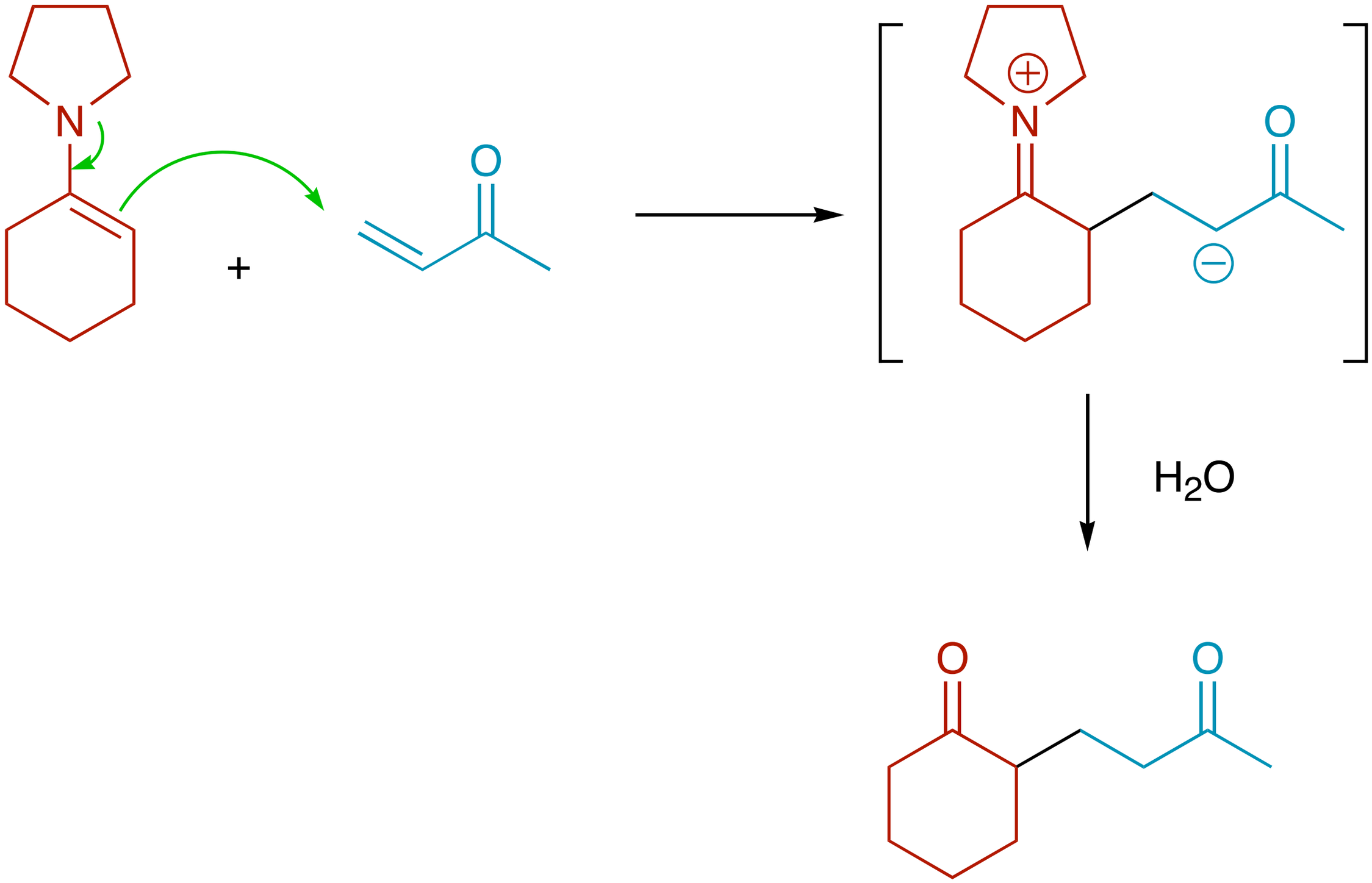

O
H
Ph
NaOEt
EtOH
O
OH
H
Ph
Ph
90%


O
NaOEt
EtOH
O
OH
22%


O
NaOEt
EtOH
O
OH
22%
heat
-H2O
O


NaOEt
EtOH
O
EtO
O
EtO
+
O
EtO
O
O
EtO
O
O
OEt
EtO


O
O
OEt
NaOEt
EtOH
O
O
OEt
+
O
O
O
OEt
O


N
O
+
N
O
H_2O
O
O