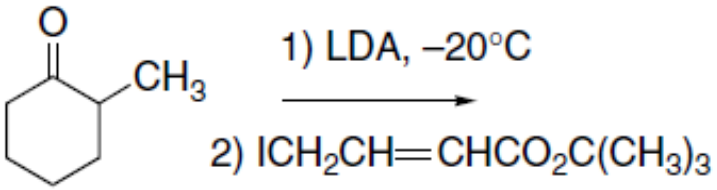
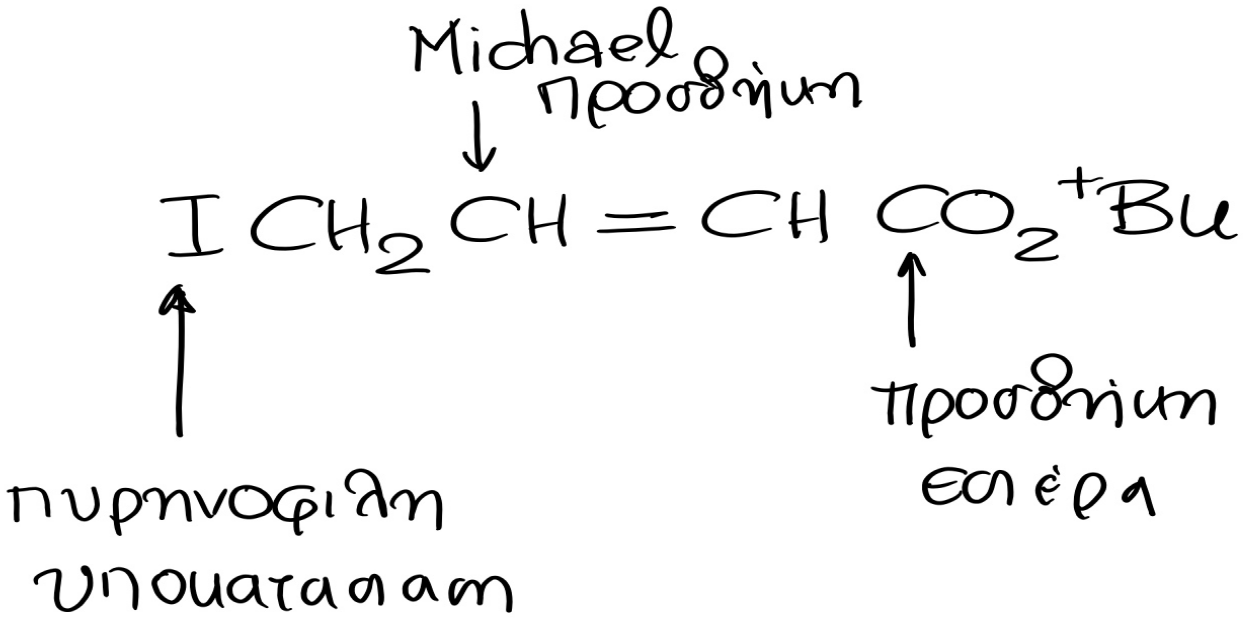
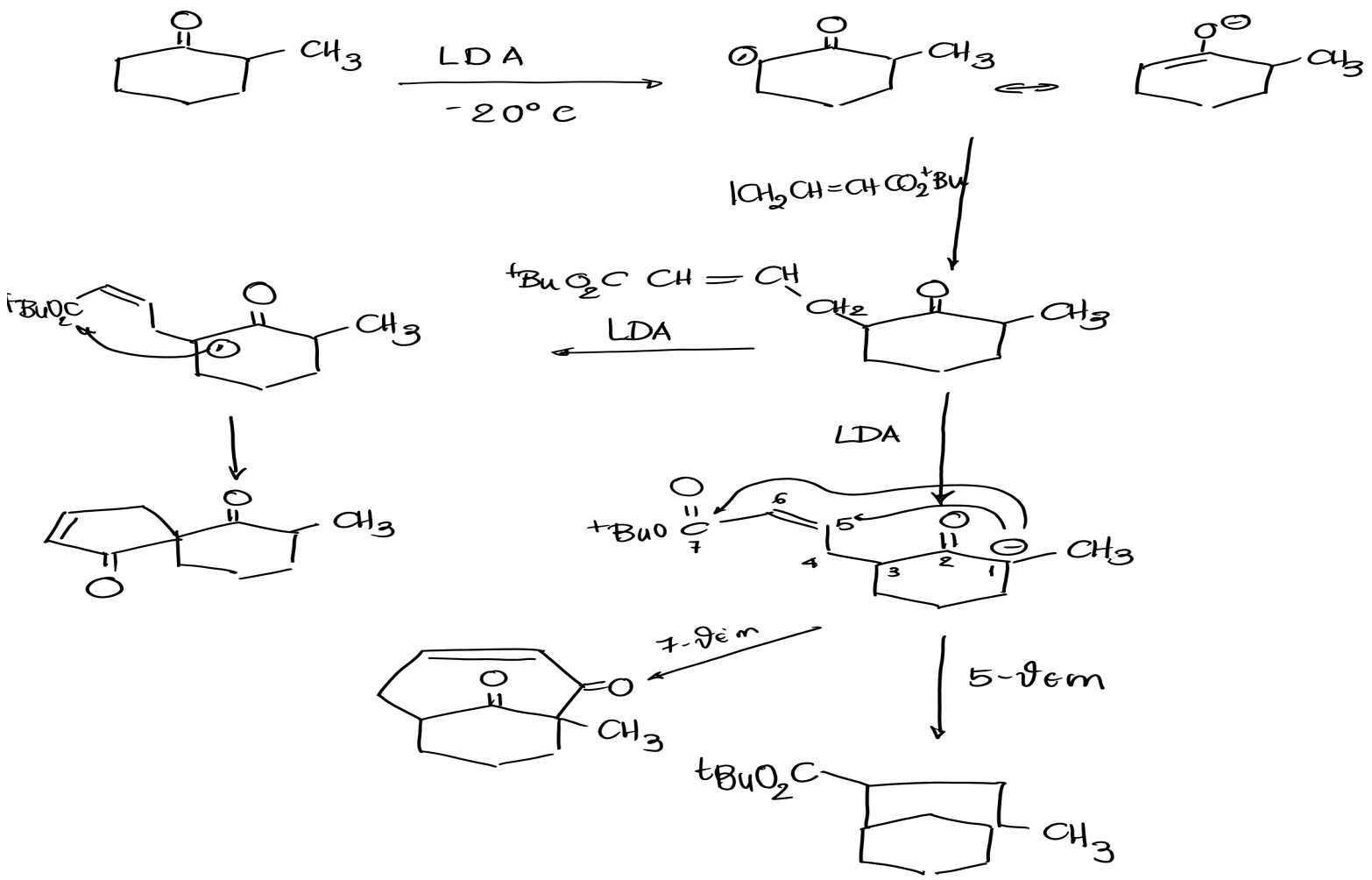
Λ. Χατζηαράπογλου

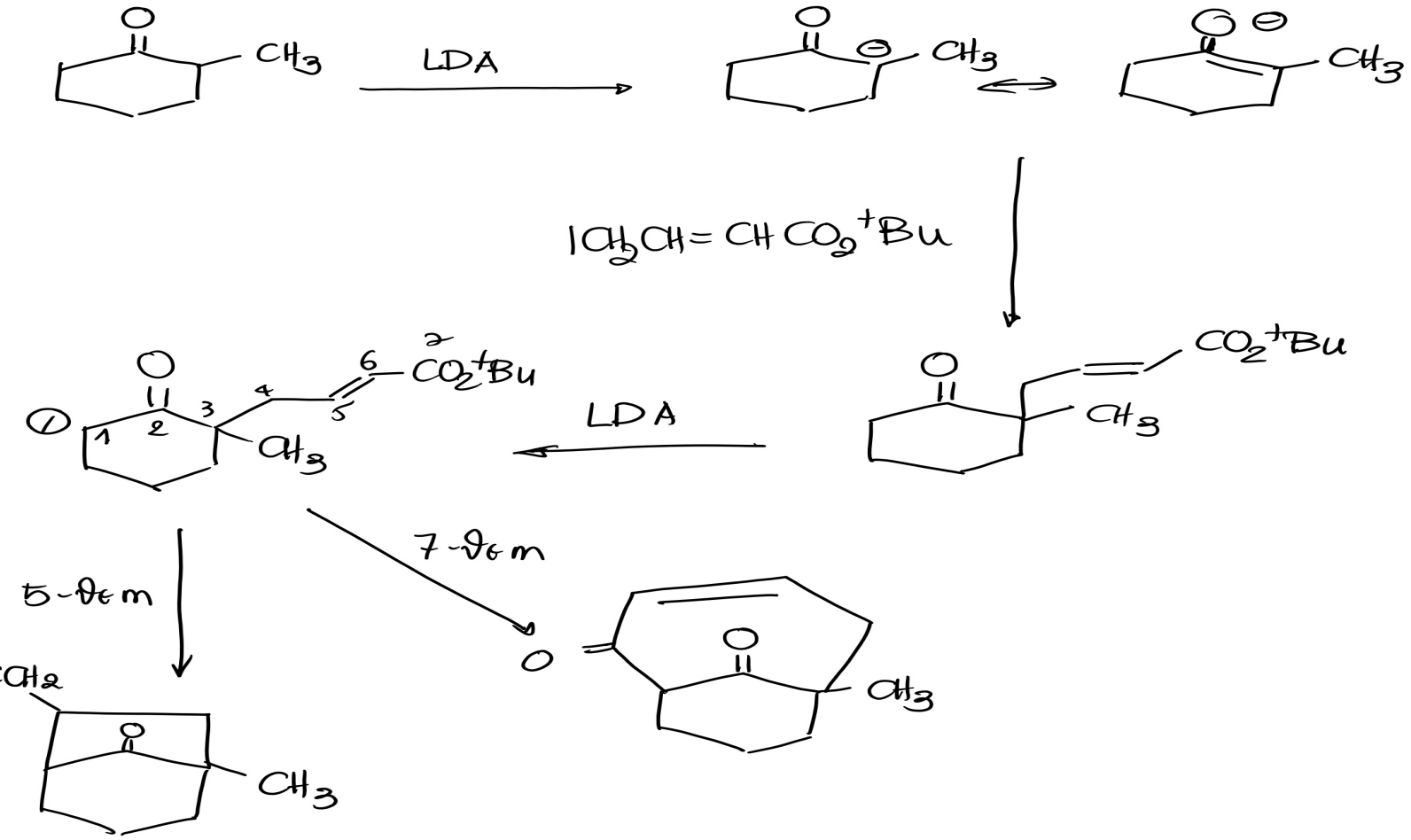
Ασκήσεις

Predict the structure and stereochemistry of the products that would be obtained under the specified reaction conditions. Explain the basis of your prediction.

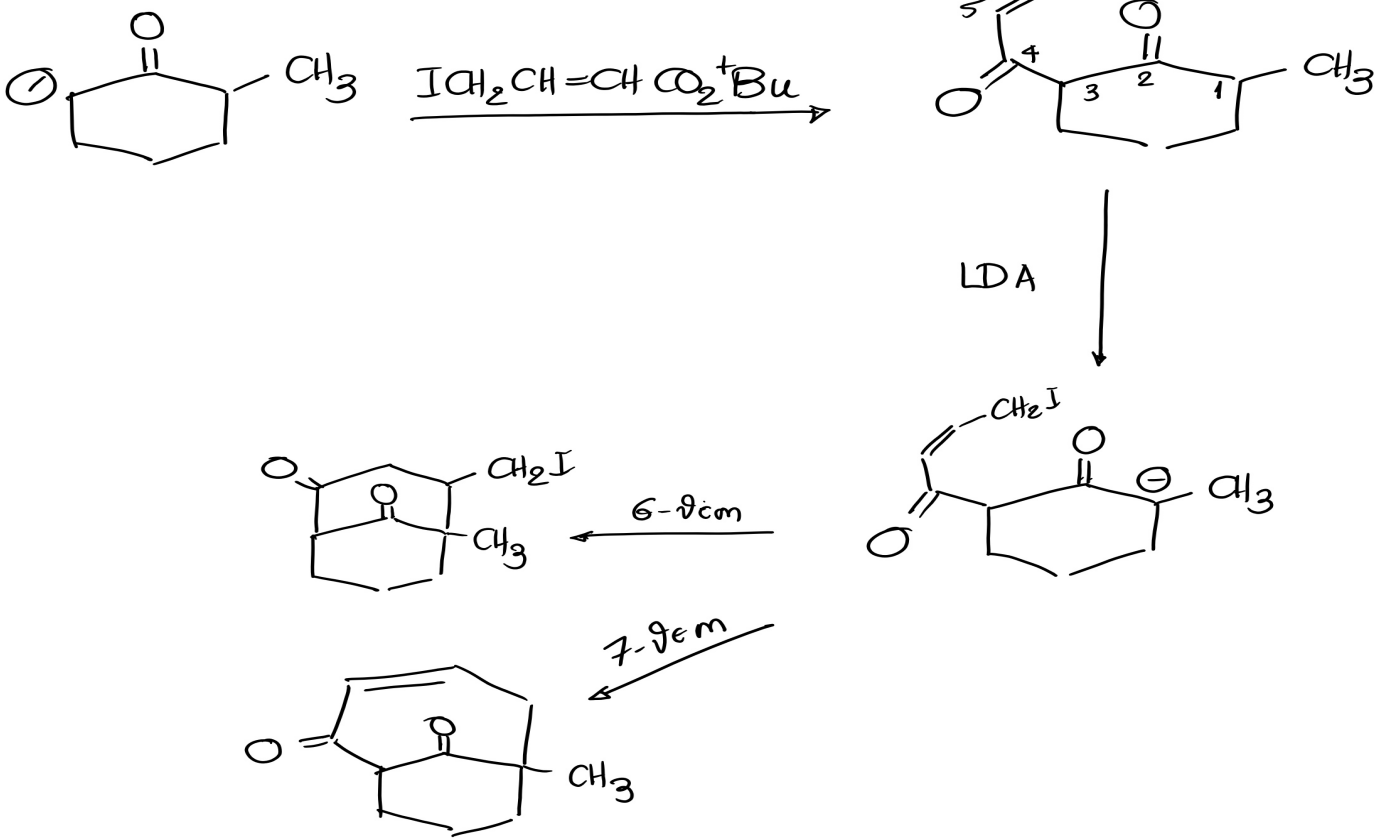
(a) 

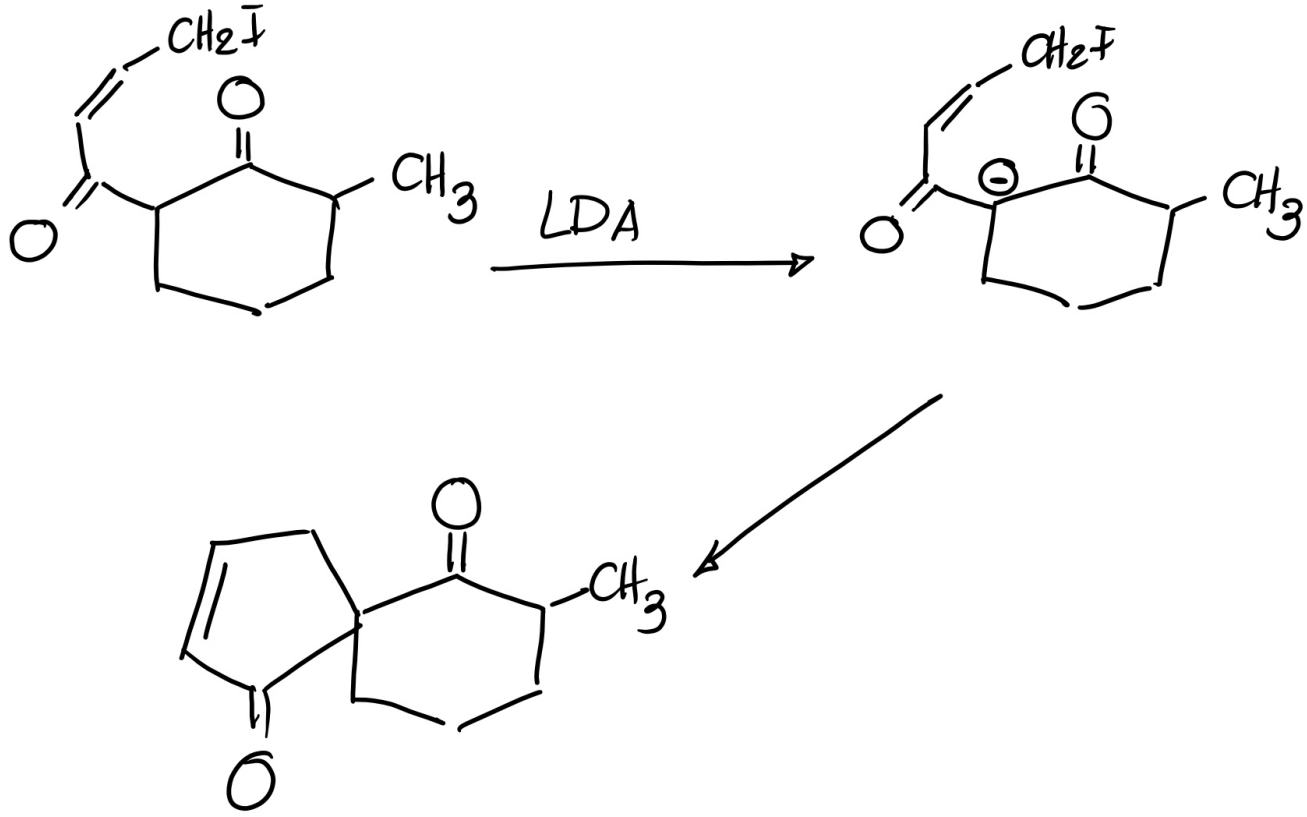

Michael προσθήκη
I CH2 CH = CH CO2+Bu
πυρηνόφιλη υποκατάσταση
προσθήκη εστέρα

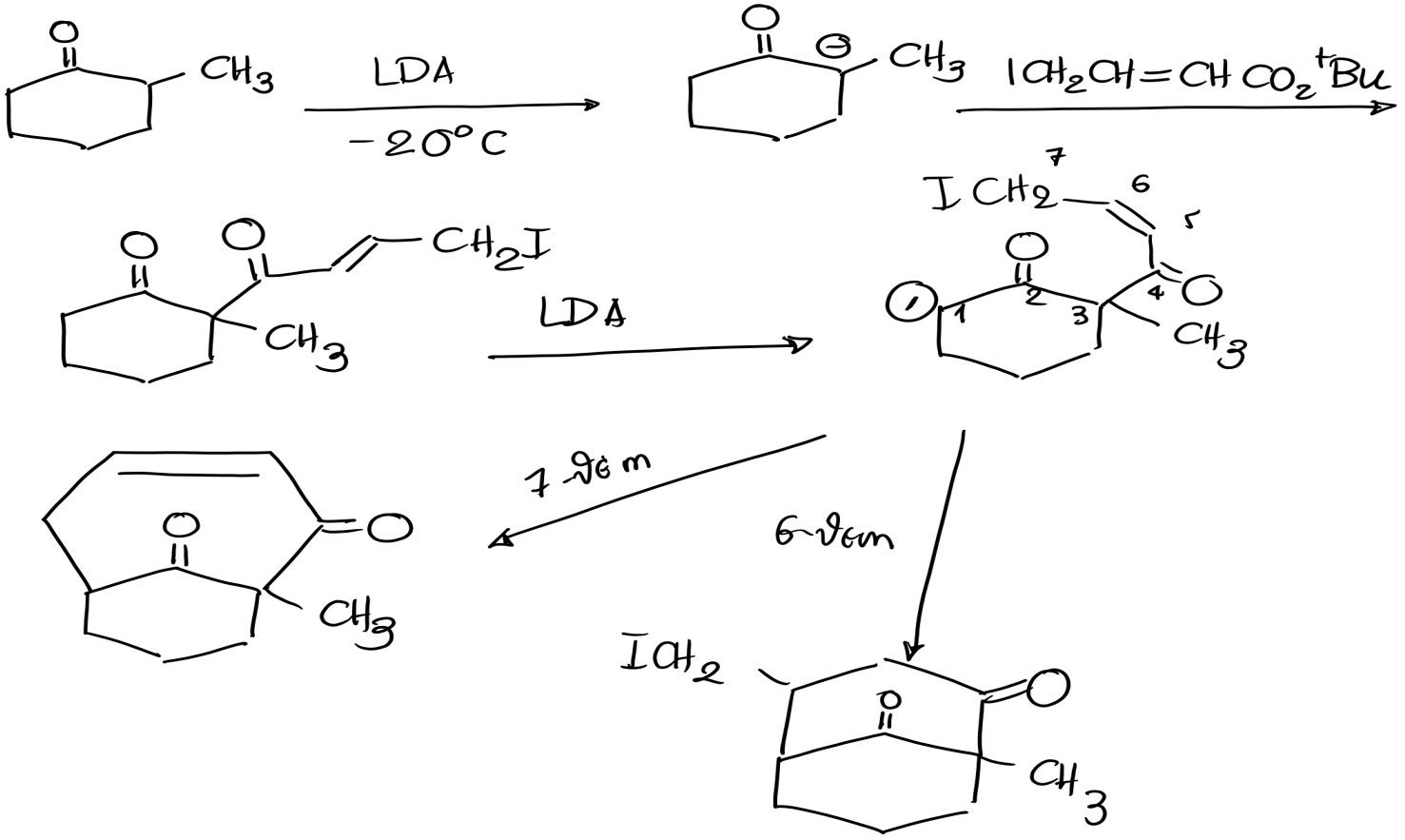

LDA
-20°C
LDA
LDA
7-Rem
5-Rem


LDA
ICH2CH=CHCO2tBu
LDA
5-Exo
7-Exo

Εναλλακτικά :

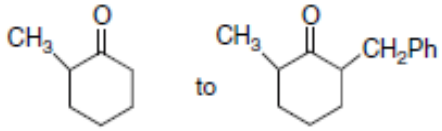



CH2I
CH3
LDA
CH2I
CH3
CH3

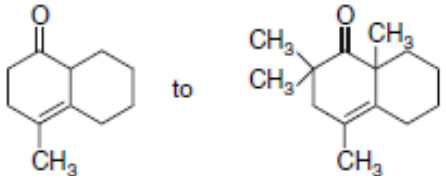

CH3
LDA
−20°C
ICH2CH=CHCO2tBu
CH2I
CH3
LDA
ICH2
7
6
5
4
3
2
1
CH3
7 Endo
6-Exo
CH3
ICH2
CH3

1.3. Suggest reagents and reaction conditions that would be suitable for effecting each of the following conversions.

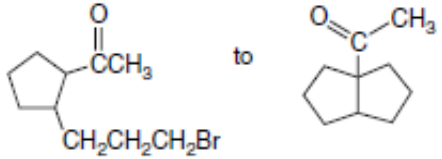
(a)

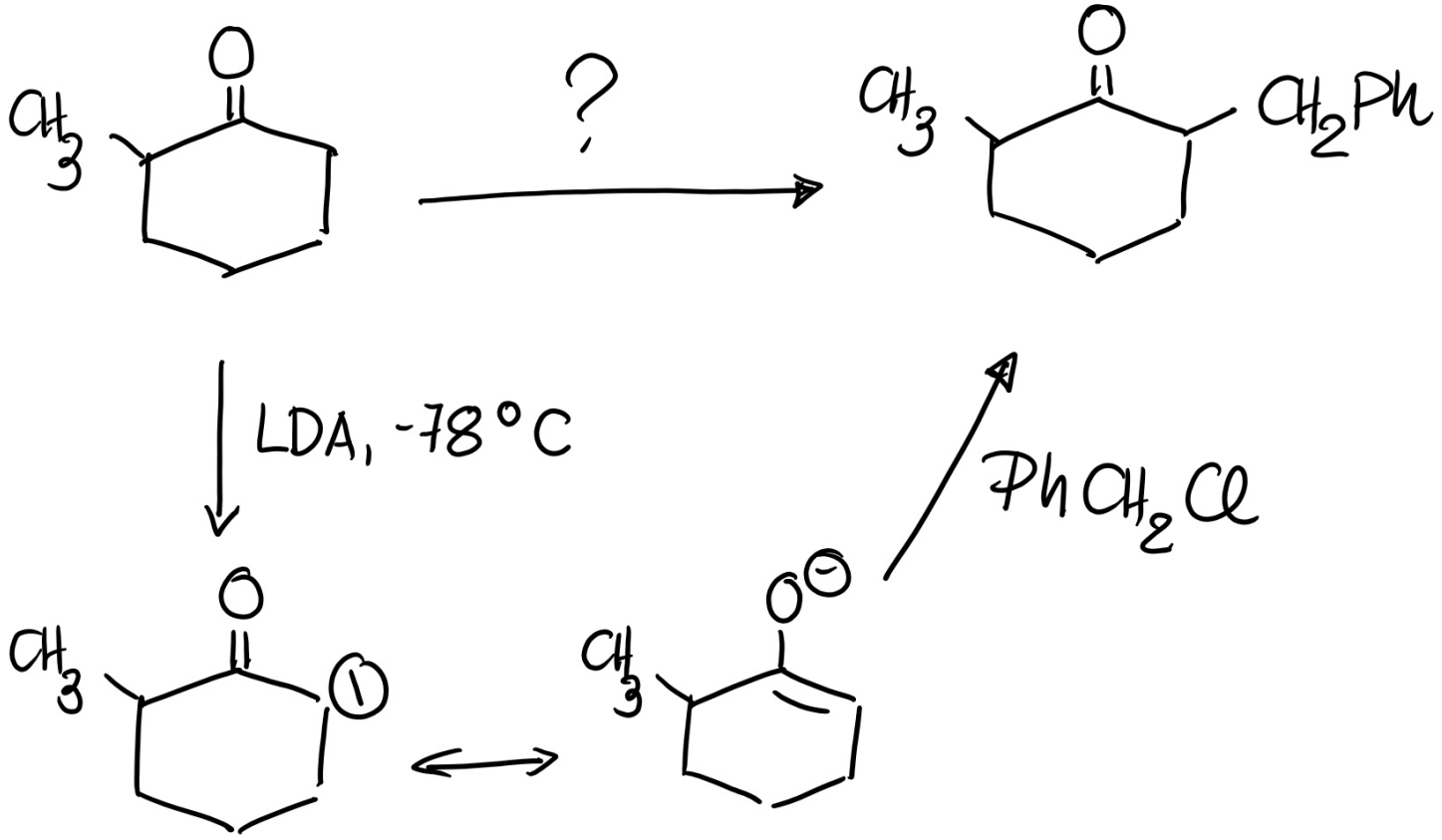


(b)

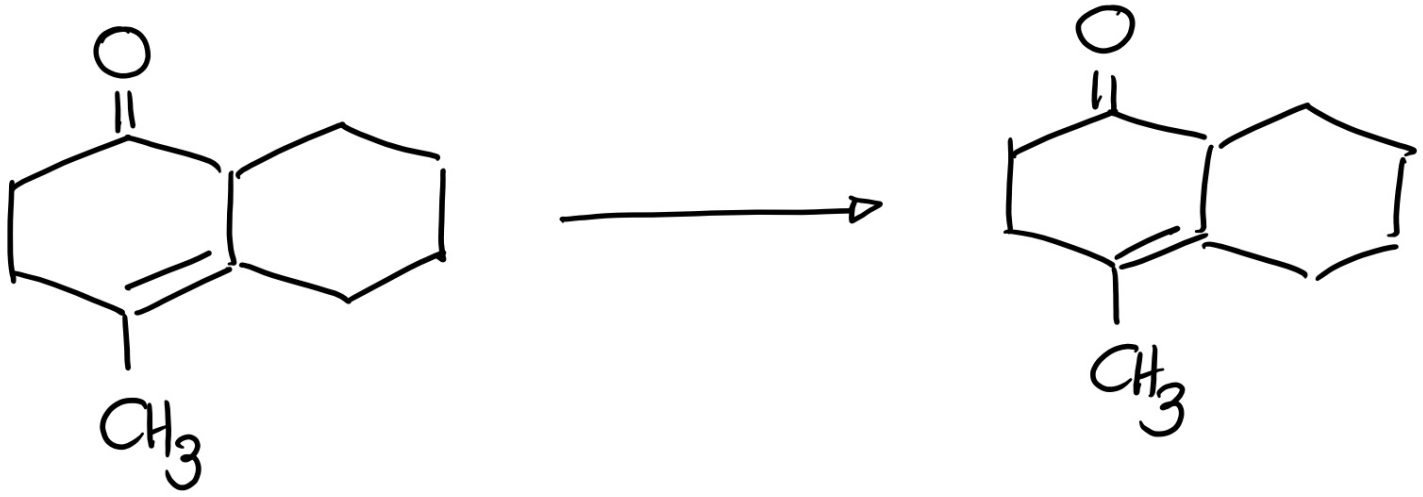


(g)



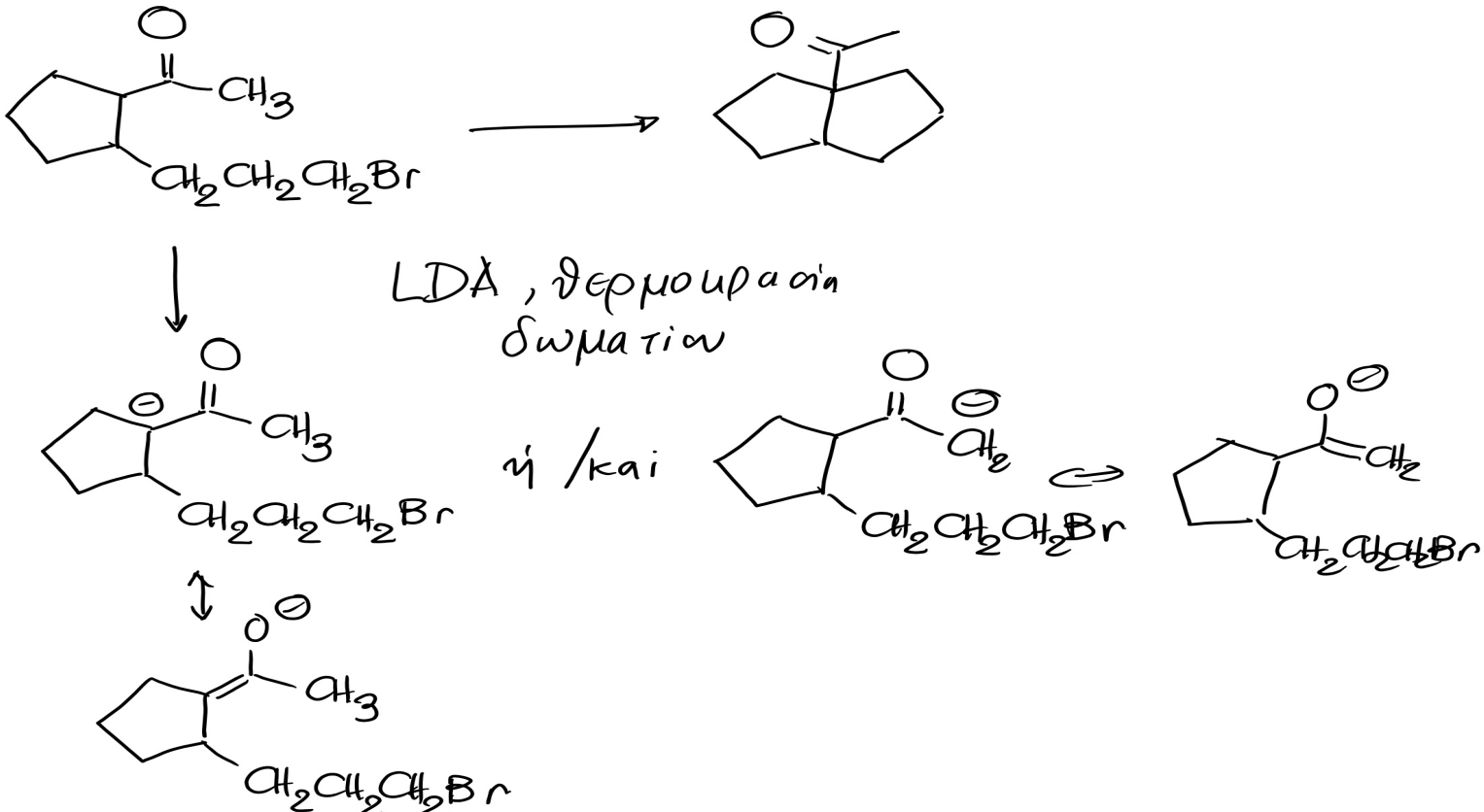

CH3
O
?
CH3
O
CH2Ph
LDA, -78°C
PhCH2Cl
CH3
O
1
CH3
O

β)



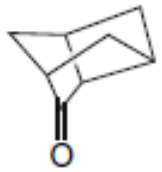
περίσσεια LDA

περίσσεια MeI

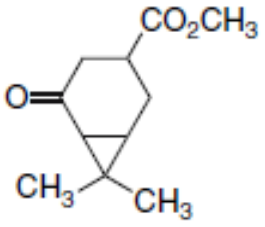

LDA, θερμοκρασία δωματίου
ή /και
Θερμοδυναμικό

Intramolecular alkylation of enolates can be used to synthesize bi- and tricyclic compounds. Identify all the bonds in the following compounds that could be formed by intramolecular enolate alkylation. Select the one that you think is most likely to succeed and suggest reasonable reactants and reaction conditions for cyclization.

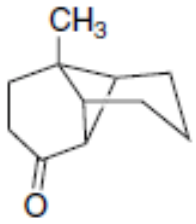
(a)



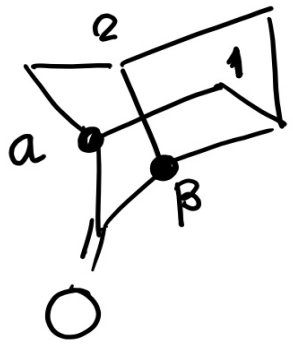
(c)



(e)



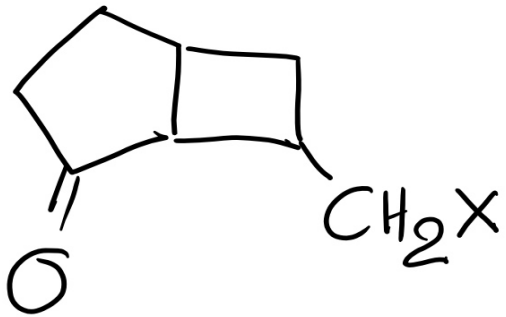
α)



α-1 πρωτοταγές αλκυλαλογονίδιο

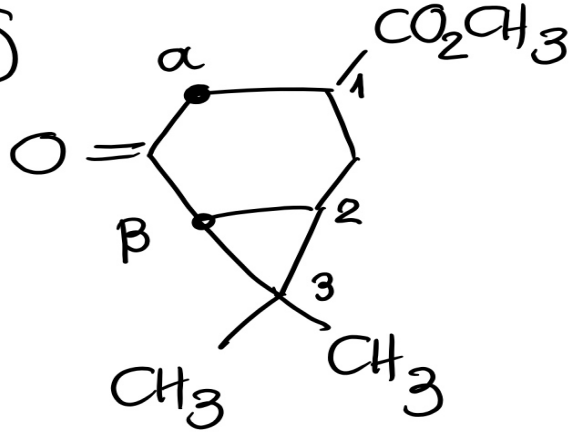
β-2 δευτεροταγές αλκυλαλογονίδια

άρα + άπομαν



, LDA, -78°C

Β)

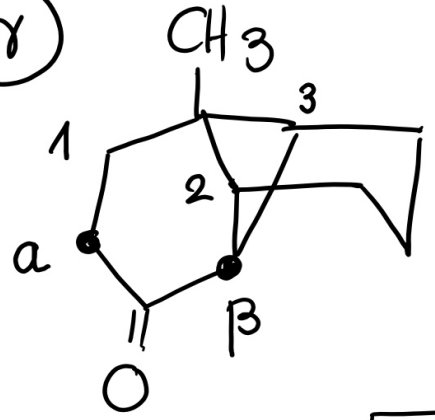


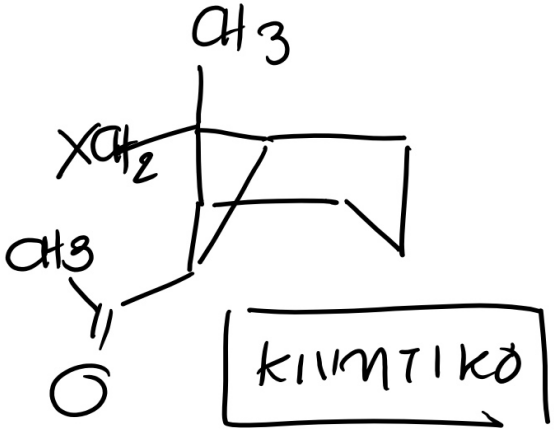
α-1	δευτεροταγές
β-2	δευτεροταγές
β-3	τριτοταγές

α-1 → LDA, -78°C → 6-μελής

β-2 → 3-μελή ?

γ)





κινητικό

α-1 πρωταγές

β-2 δευτεροταγές

β-3 δευτεροταγές

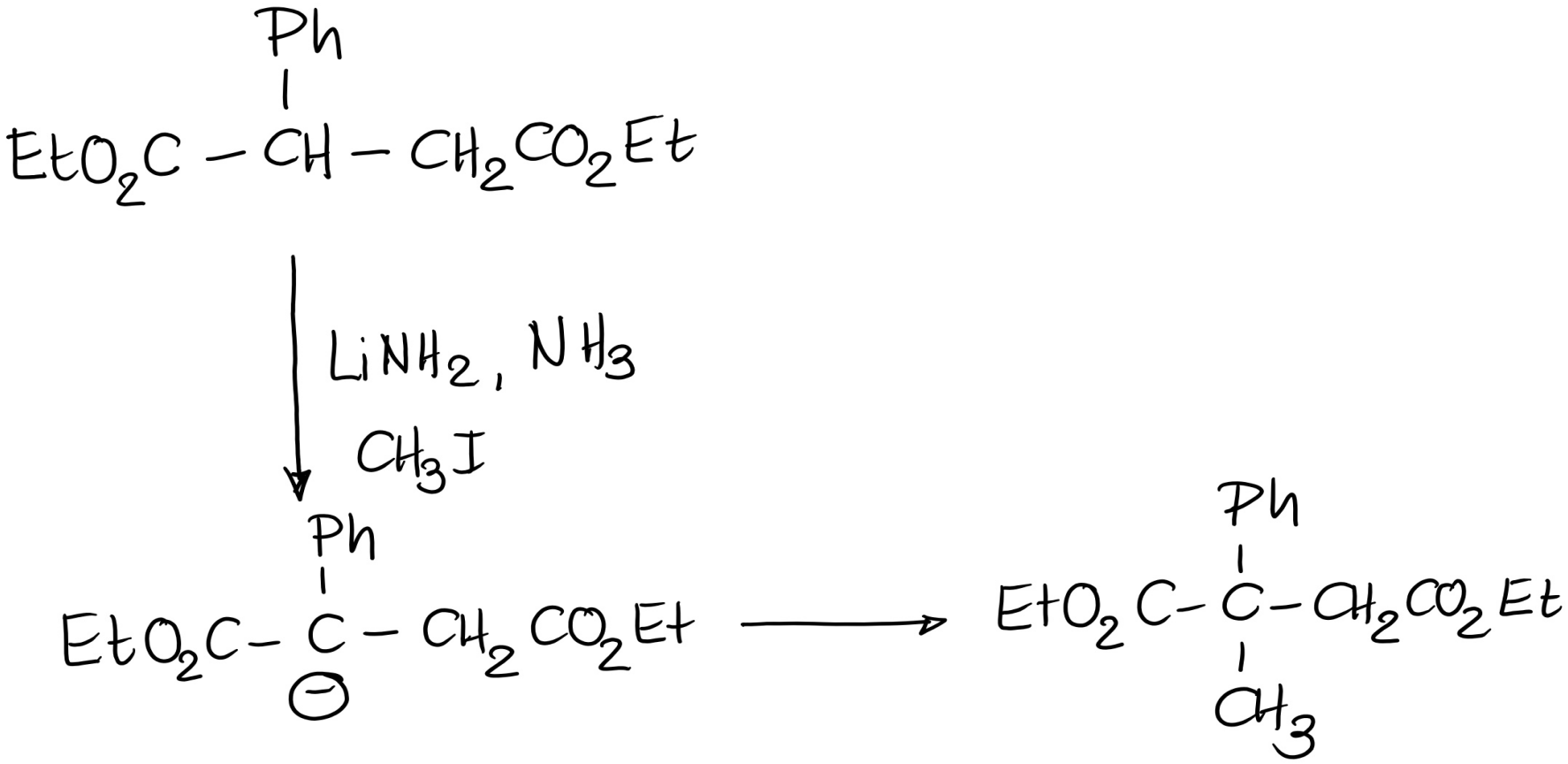
Predict the major product of each of the following reactions:

(a) $PhCH(CH_2CO_2Et)CO_2Et$ $\xrightarrow[(2)\ CH_3I]{(1)\ 1\ equiv\ LiNH_2/NH_3}$

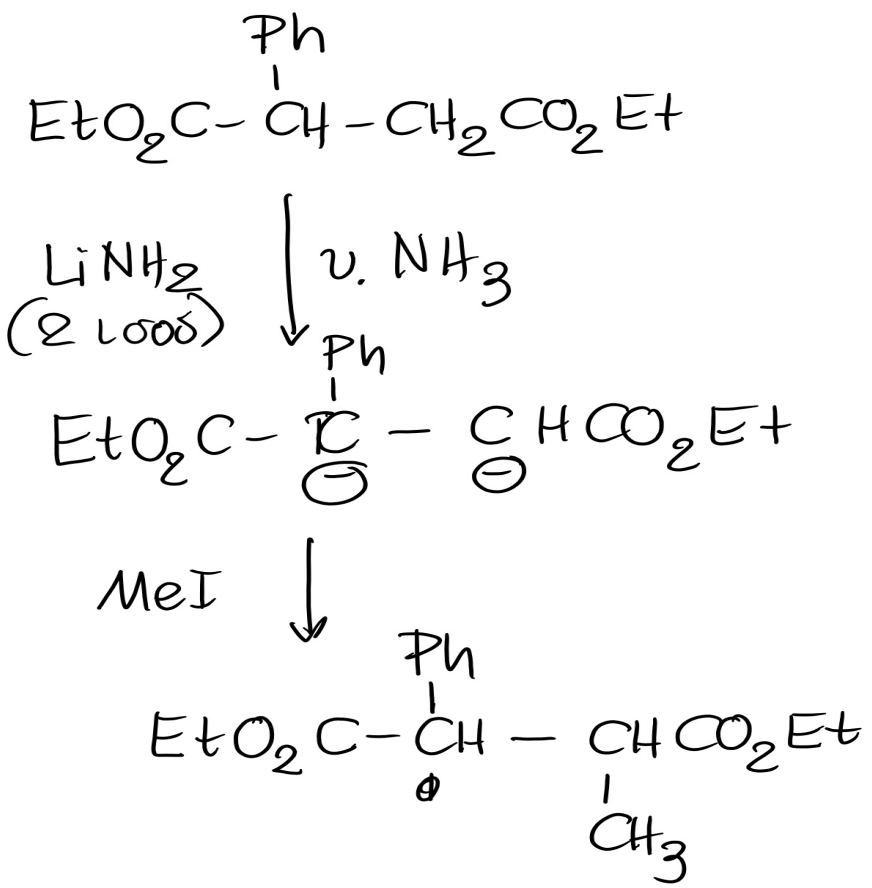
(b) $PhCH(CH_2CO_2Et)CO_2Et$ $\xrightarrow[(2)\ CH_3I]{(1)\ 2\ equiv\ LiNH_2/NH_3}$

(c) $PhCH(CH_2CO_2Et)CO_2H$ $\xrightarrow[(2)\ CH_3I]{(1)\ 2\ equiv\ LiNH_2/NH_3}$

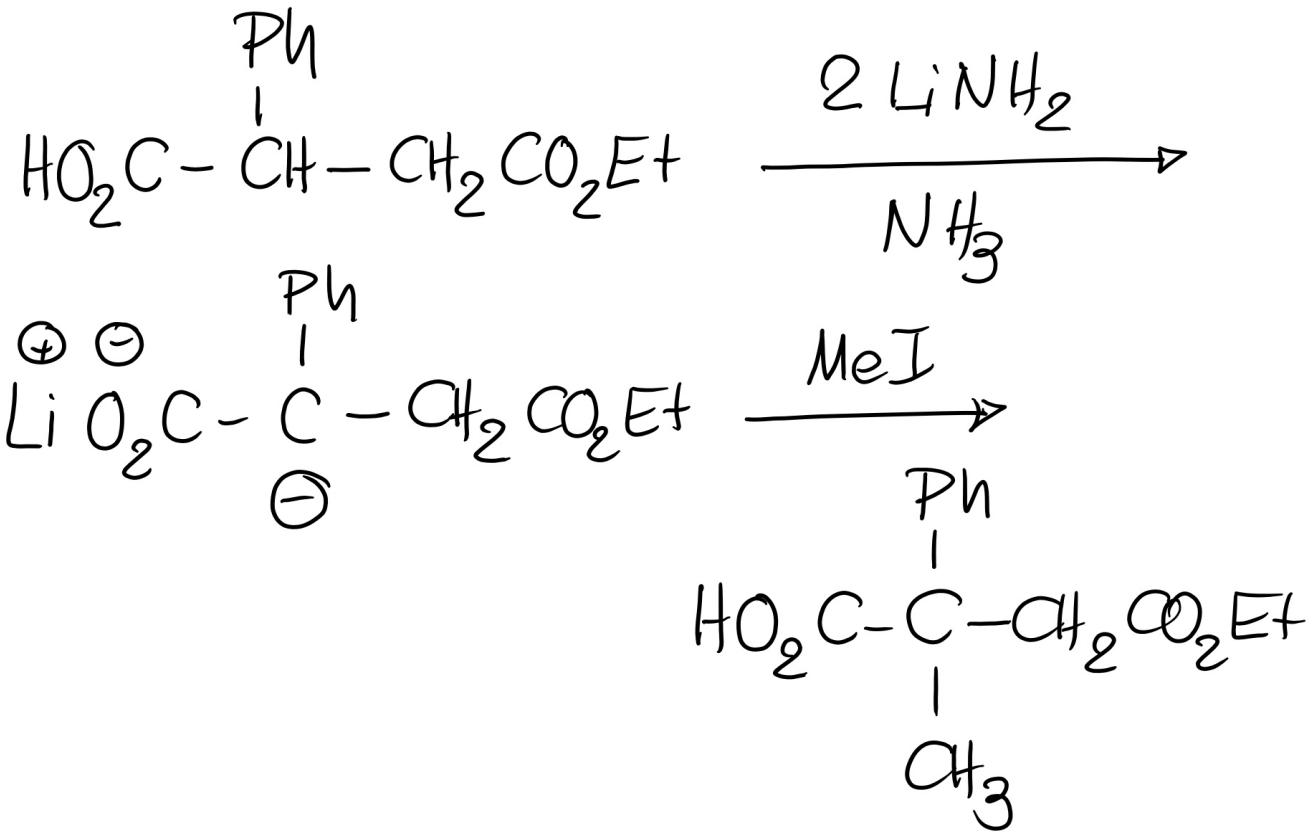
a)


Ph
EtO2C – CH – CH2CO2Et
LiNH2, NH3
CH3I
Ph
EtO2C – C – CH2CO2Et
⊖
Ph
EtO2C – C – CH2CO2Et
CH3

B)

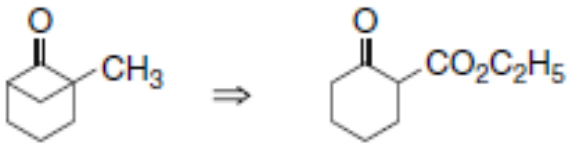

Ph
EtO2C – CH – CH2CO2Et
LiNH2
(2 1000)
v. NH3
Ph
EtO2C – C – CHCO2Et
MeI
Ph
EtO2C – CH – CHCO2Et
CH3

(٢)

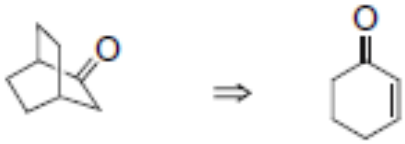

Ph
HO2C – CH – CH2CO2Et
2 LiNH2
NH3
Ph
Li O2C – C – CH2CO2Et
MeI
Ph
HO2C – C – CH2CO2Et
CH3

Perform a retrosynthetic dissection of each of the following compounds to the suggested starting material using reactions that involve alkylation of an enolate or an enolate equivalent. Then suggest a sequence of reactions that you think would succeed in converting the suggested starting material to the desired product.

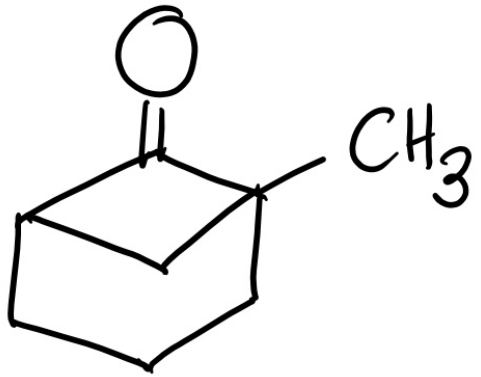
(a)



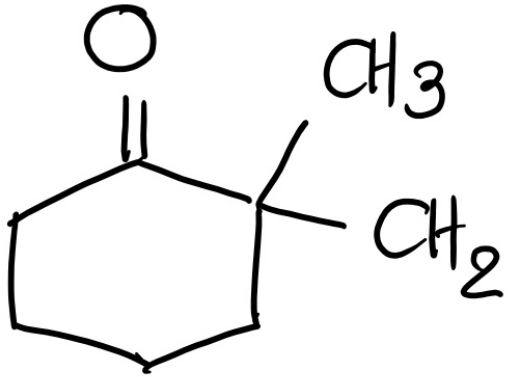
(b)



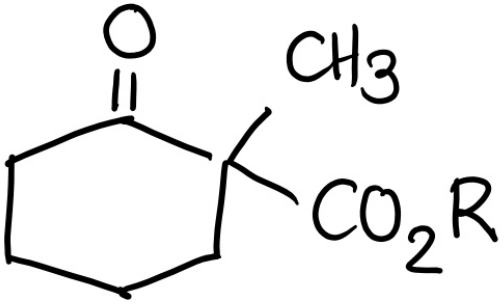
a)



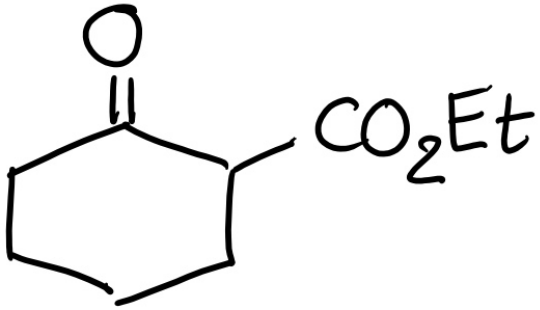
⟹

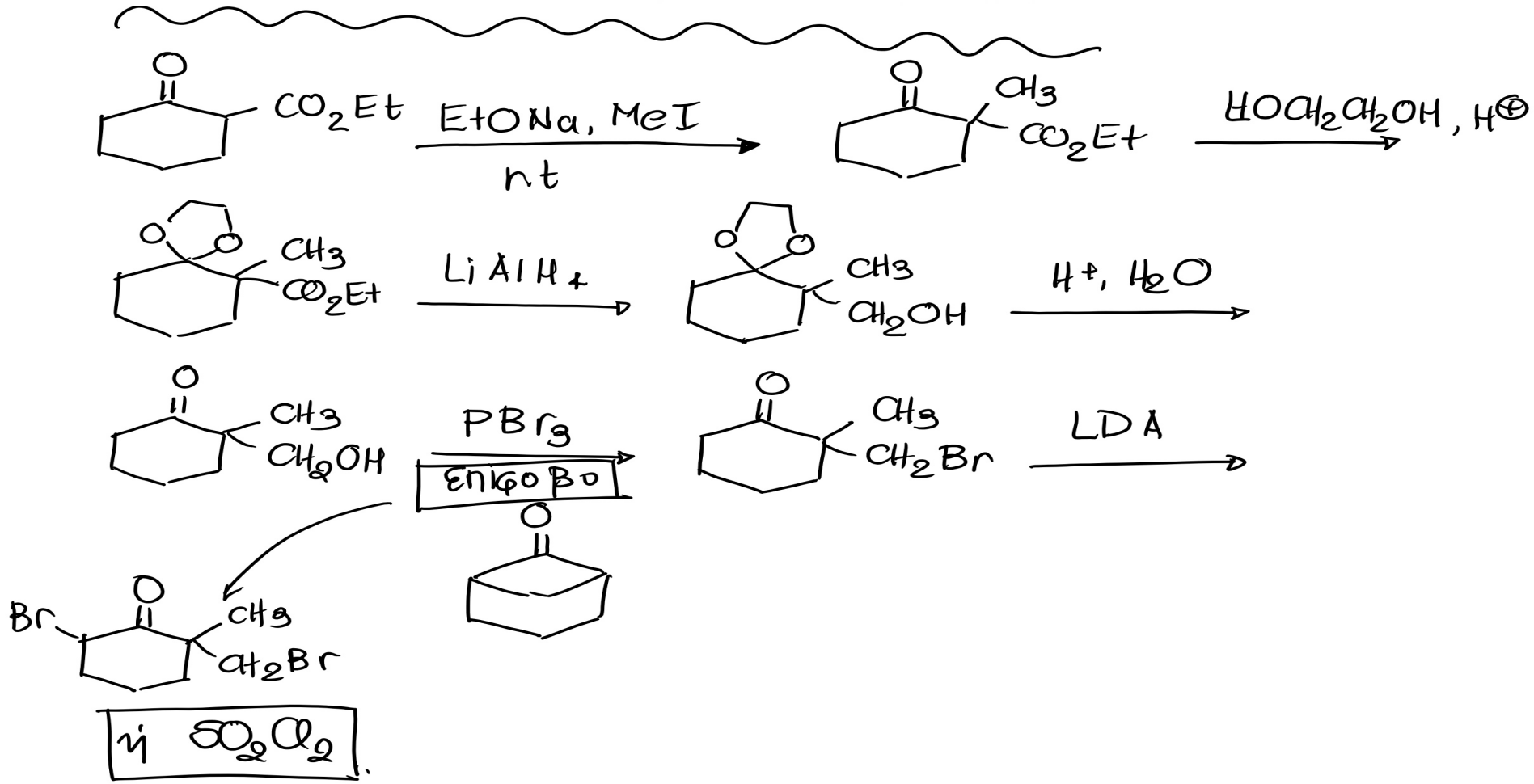


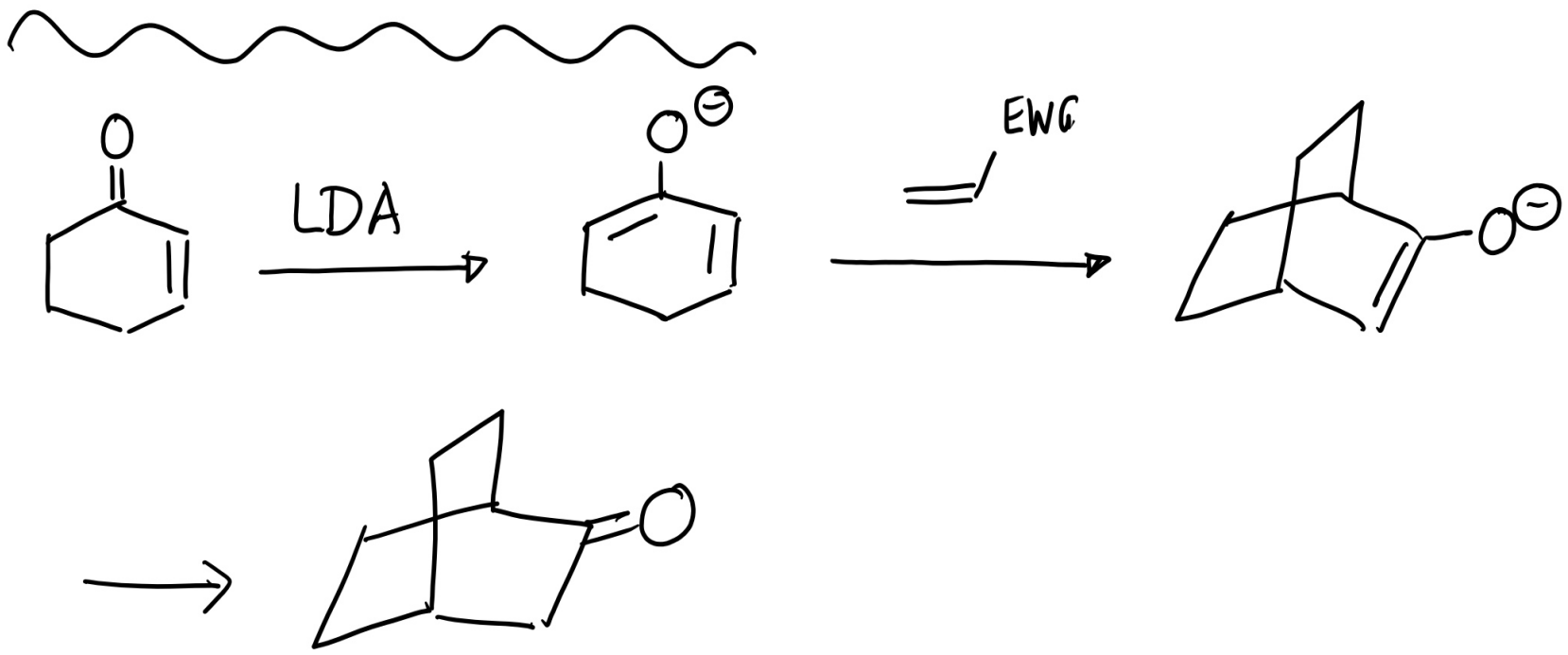
⟹



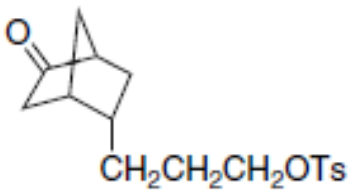
⟹

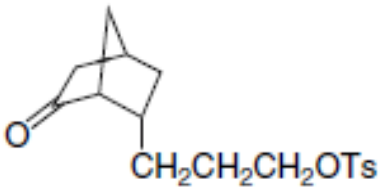


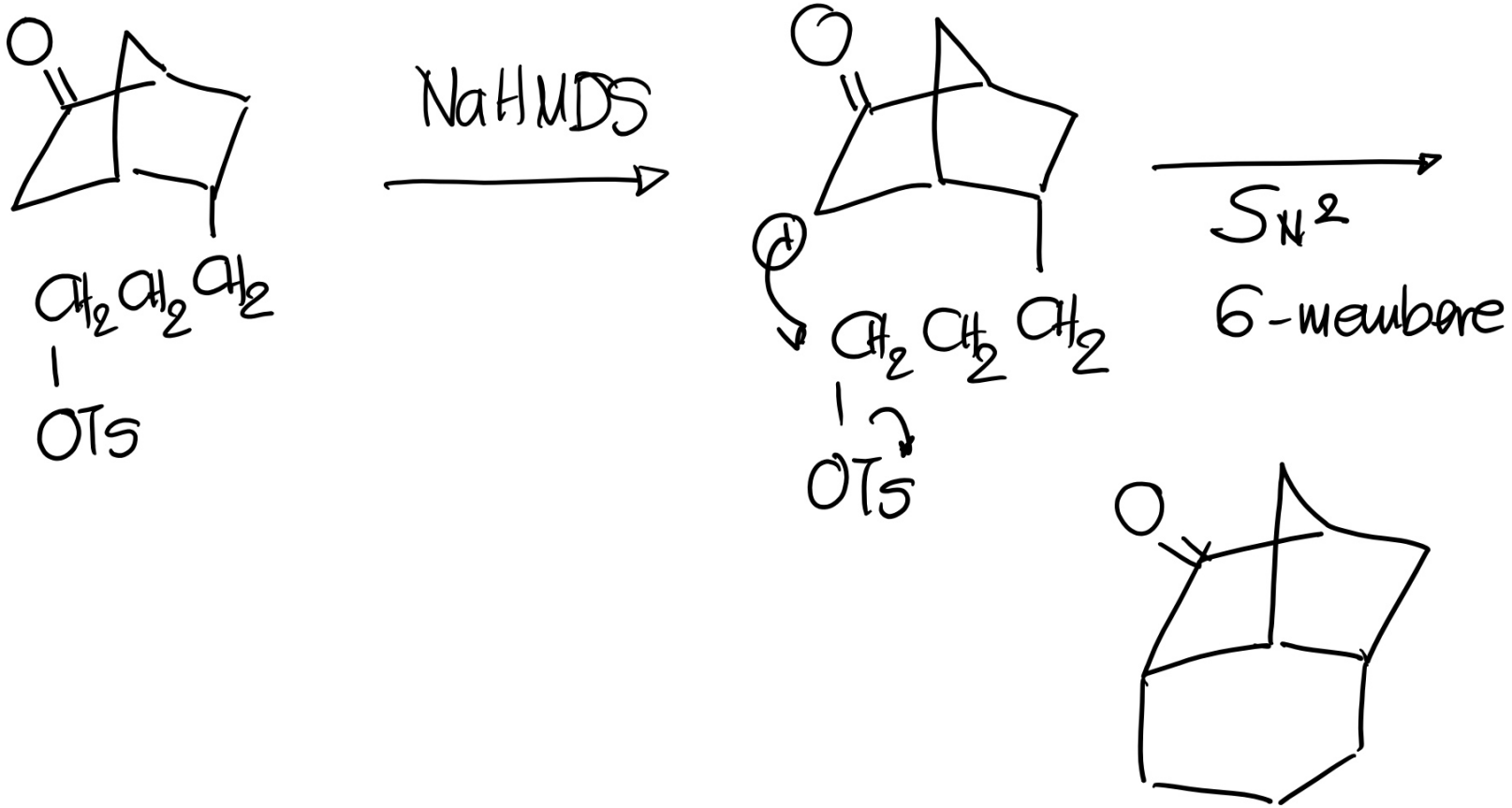

CO2Et
EtONa, MeI
rt
CH3
CO2Et
HOCH2CH2OH, H⊕
CH3
CO2Et
LiAlH4
CH3
CH2OH
H+, H2O
CH3
CH2OH
PBr3
Et2O
CH3
CH2Br
LDA
Br
CH3
CH2Br
ή SO2Cl2

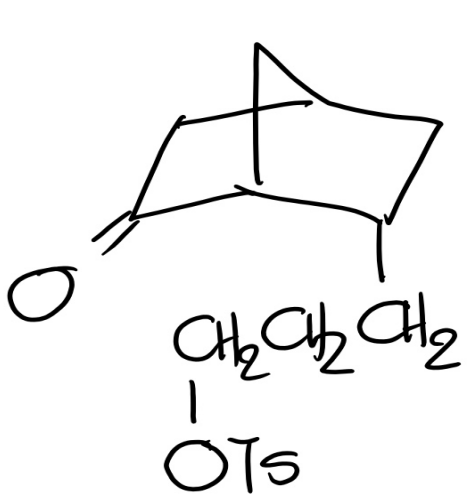

LDA
EWG

One of the compounds shown below undergoes intramolecular cyclization to give a tricyclic ketone on being treated with NaHMDS, but the other does not cyclize. Indicate which compound will cyclize more readily and offer and explanation.

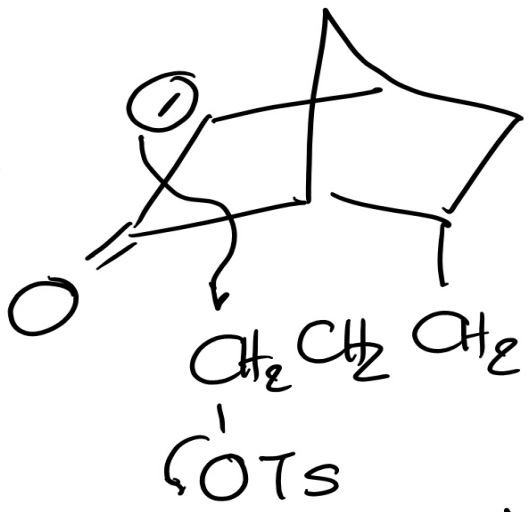


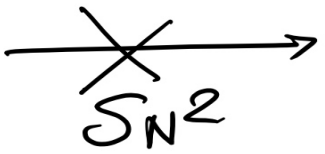



NaHMDS
OTs
SN2
6-membore

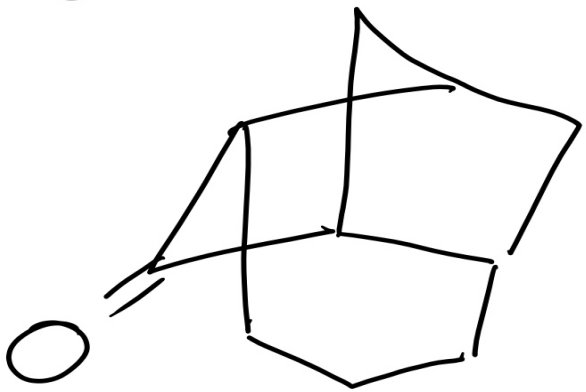


NaHMDS



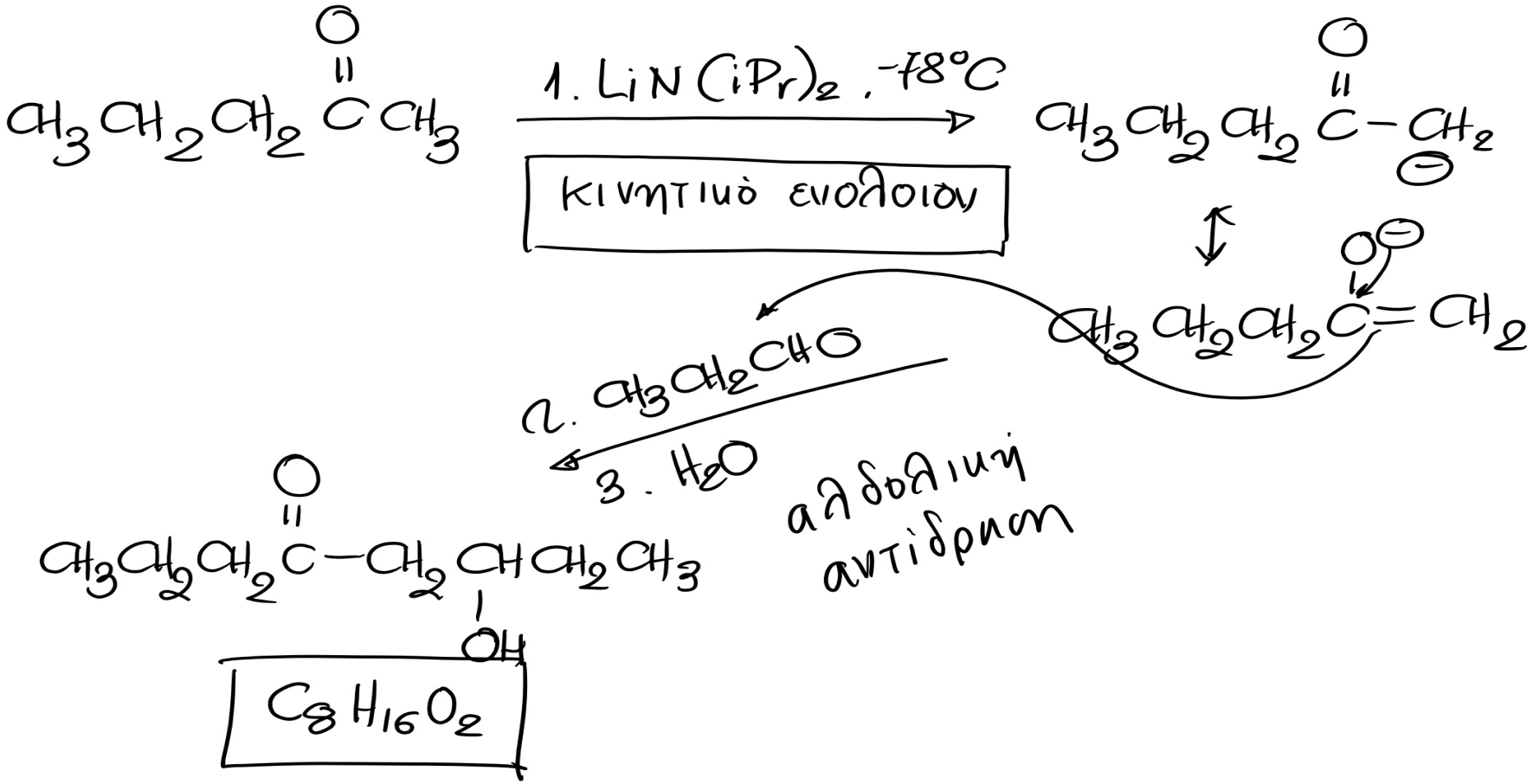


7-membered

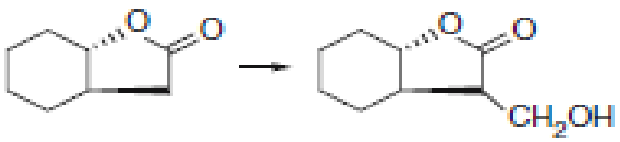


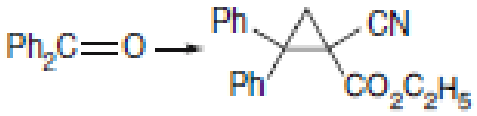
Predict the product formed in each of the following reactions:

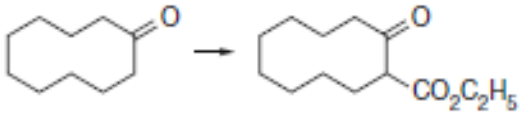
(c) $CH_3CH_2CH_2\overset{\overset{O}{\|}}{C}CH_3$ $\xrightarrow[2)\ CH_3CH_2CHO,\ 15\ min]{1)\ LiN(i\text{-}Pr)_2,\ -78^\circ C}$ $\xrightarrow[3)H_2O]{}$ $C_8H_{16}O_2$

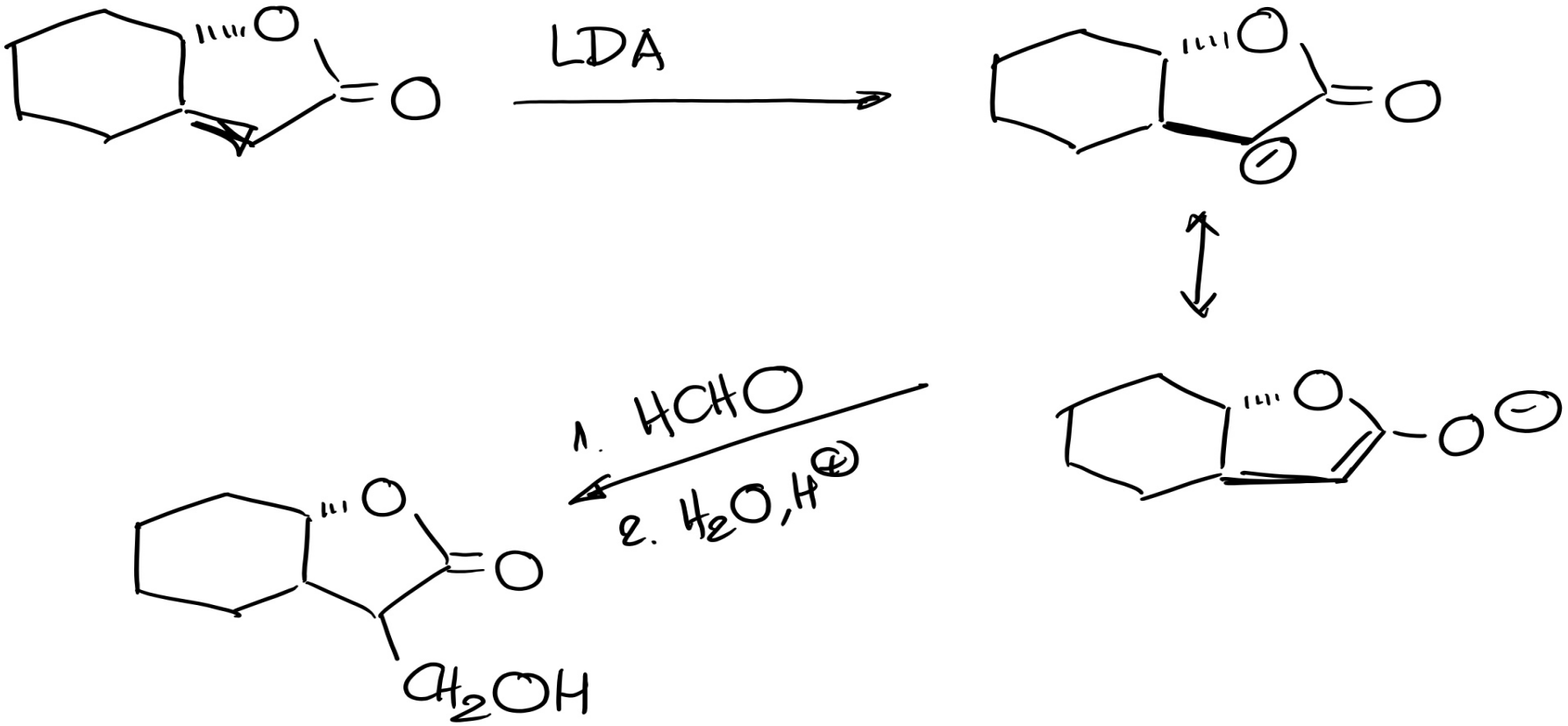

1. LiN(iPr)2 , -78°C
κινητικό ενολάτη
2. CH3CH2CHO
3. H2O
αλδολική αντίδραση
C8H16O2

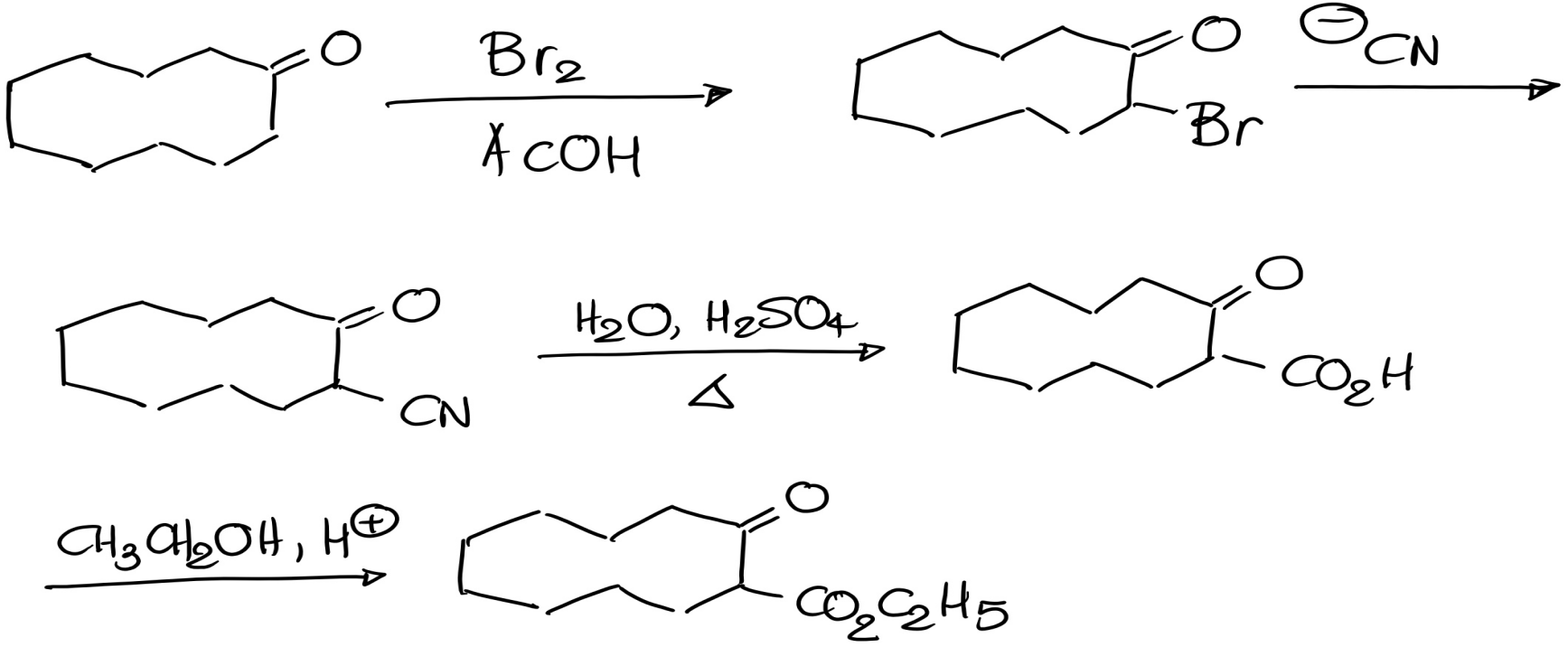
Indicate reaction conditions or a series of reactions that could effect each of the following synthetic conversions:

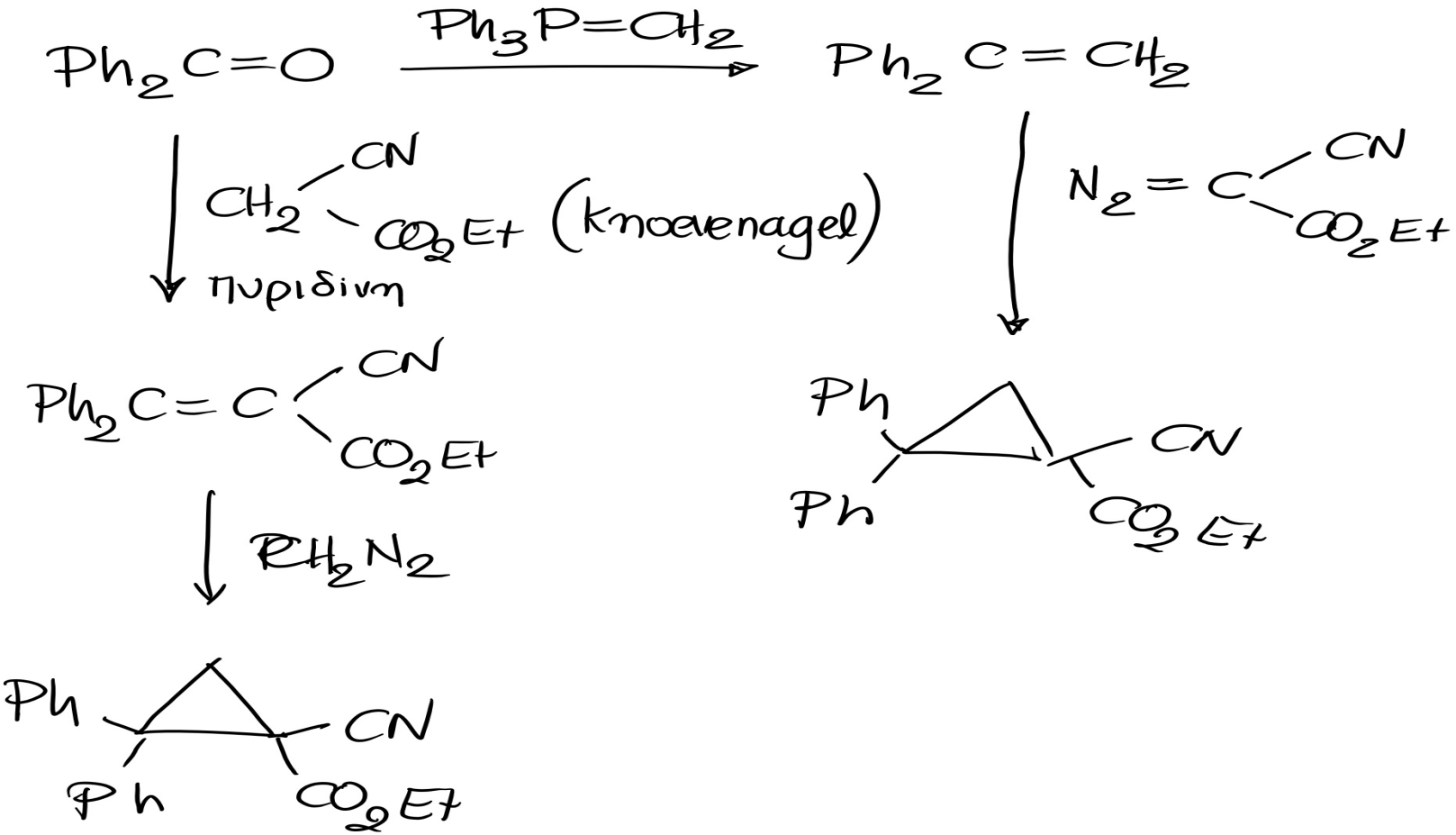


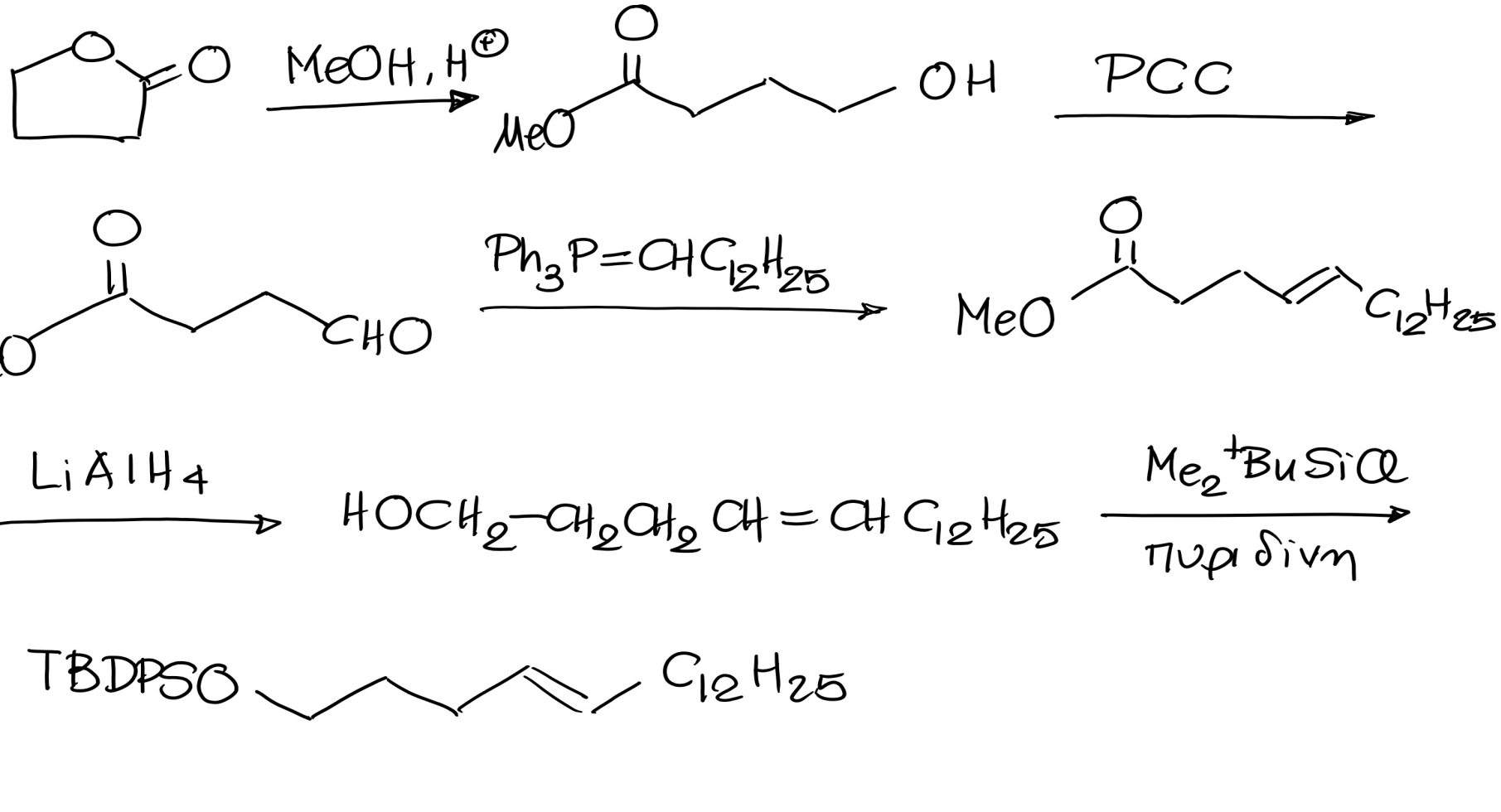




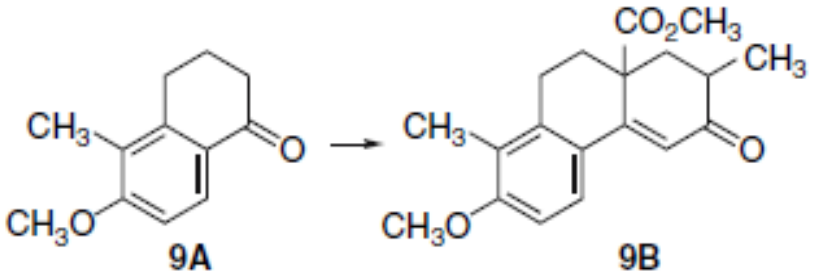

LDA
1. HCHO
2. H2O, H⊕
CH2OH


O
Br2
AcOH
O
Br
⊖CN
O
CN
H2O, H2SO4
Δ
O
CO2H
CH3CH2OH, H⊕
O
CO2C2H5

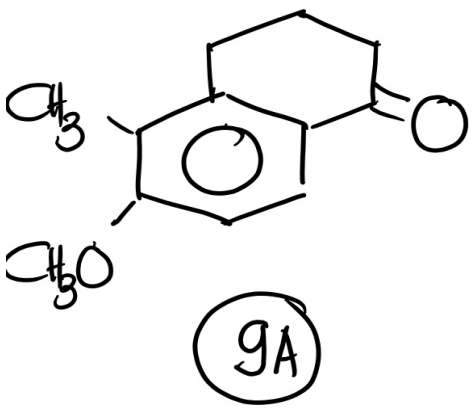

Ph2C=O
Ph3P=CH2
Ph2C=CH2
CH2(CN)CO2Et (knoevenagel)
πυριδινη
N2=C(CN)CO2Et
Ph2C=C(CN)CO2Et
CH2N2
Ph
Ph
CN
CO2Et
Ph
Ph
CN
CO2Et


MeOH, H⊕
PCC
Ph3P=CHC12H25
LiAlH4
Me2tBuSiCl
πυριδίνη
TBDPSO
C12H25

The first few steps in a synthesis of the alkaloid conessine produce **9B**, starting from **9A**. Suggest a sequence of reactions for effecting this conversion.

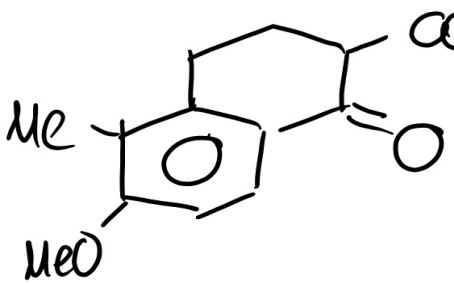


9A **9B**

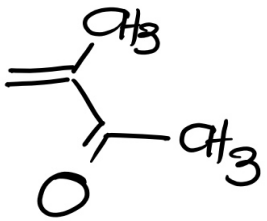


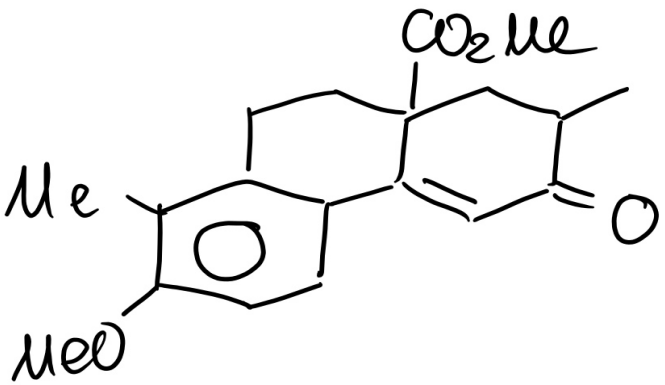
9A

1. Br_2, AcOH
2. Mg, Et_2O
3. CO_2
4. H_2O, $H^{\oplus}$
5. MeOH, $H^{\oplus}$



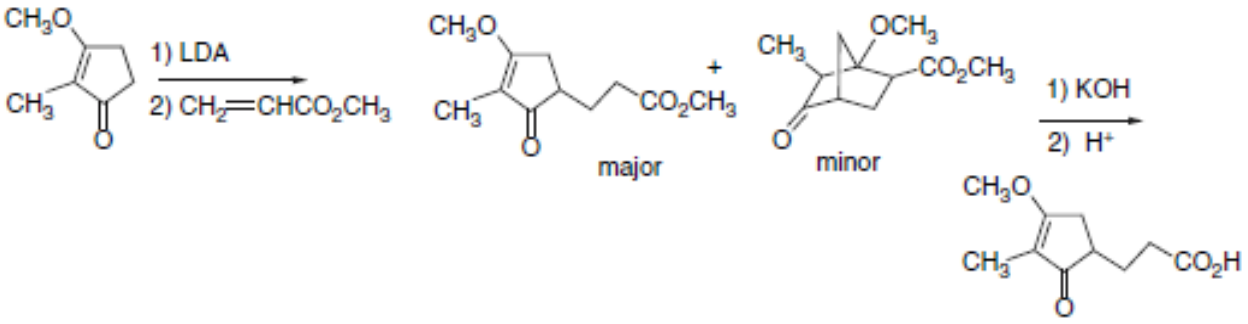
Base

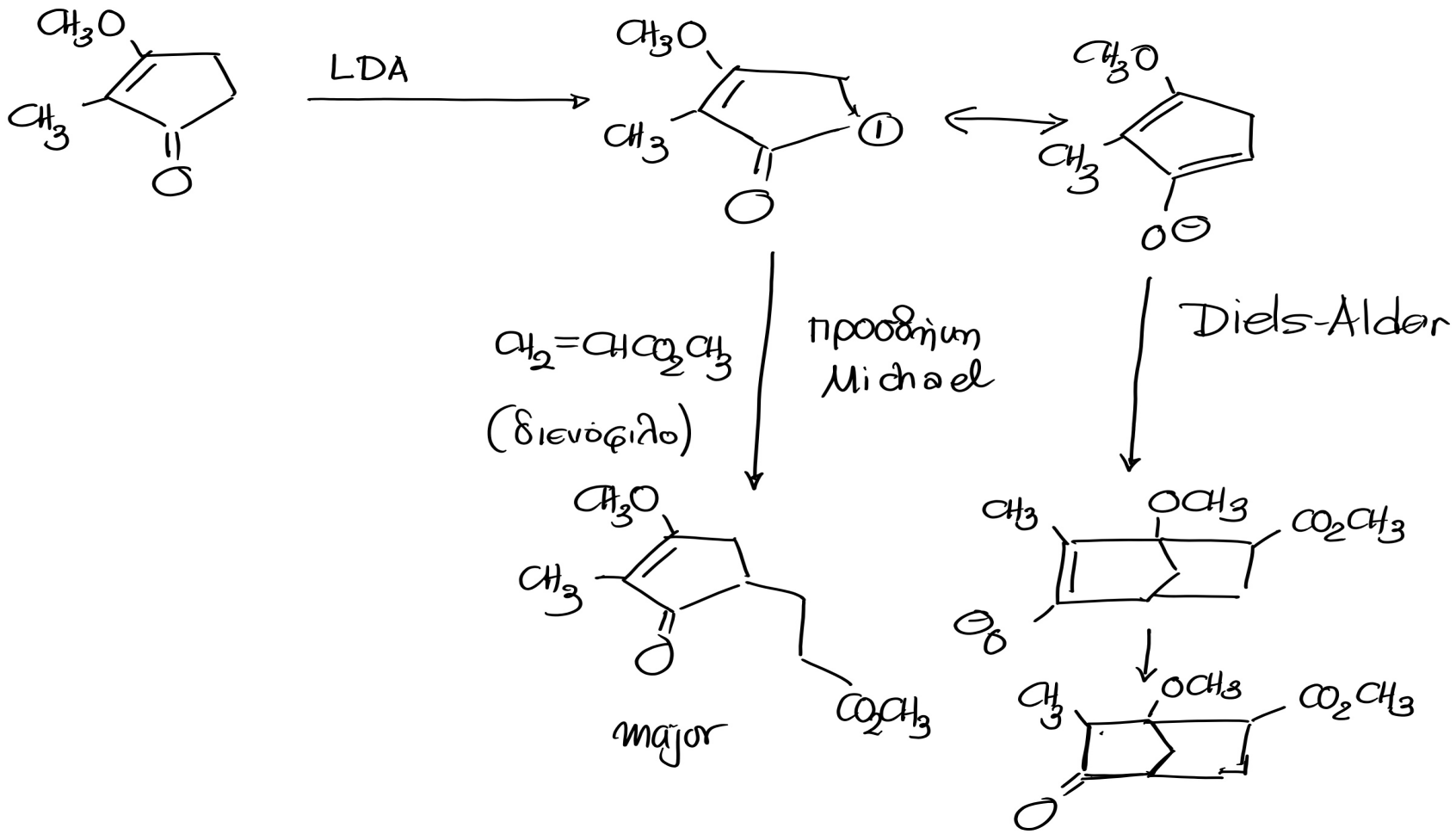


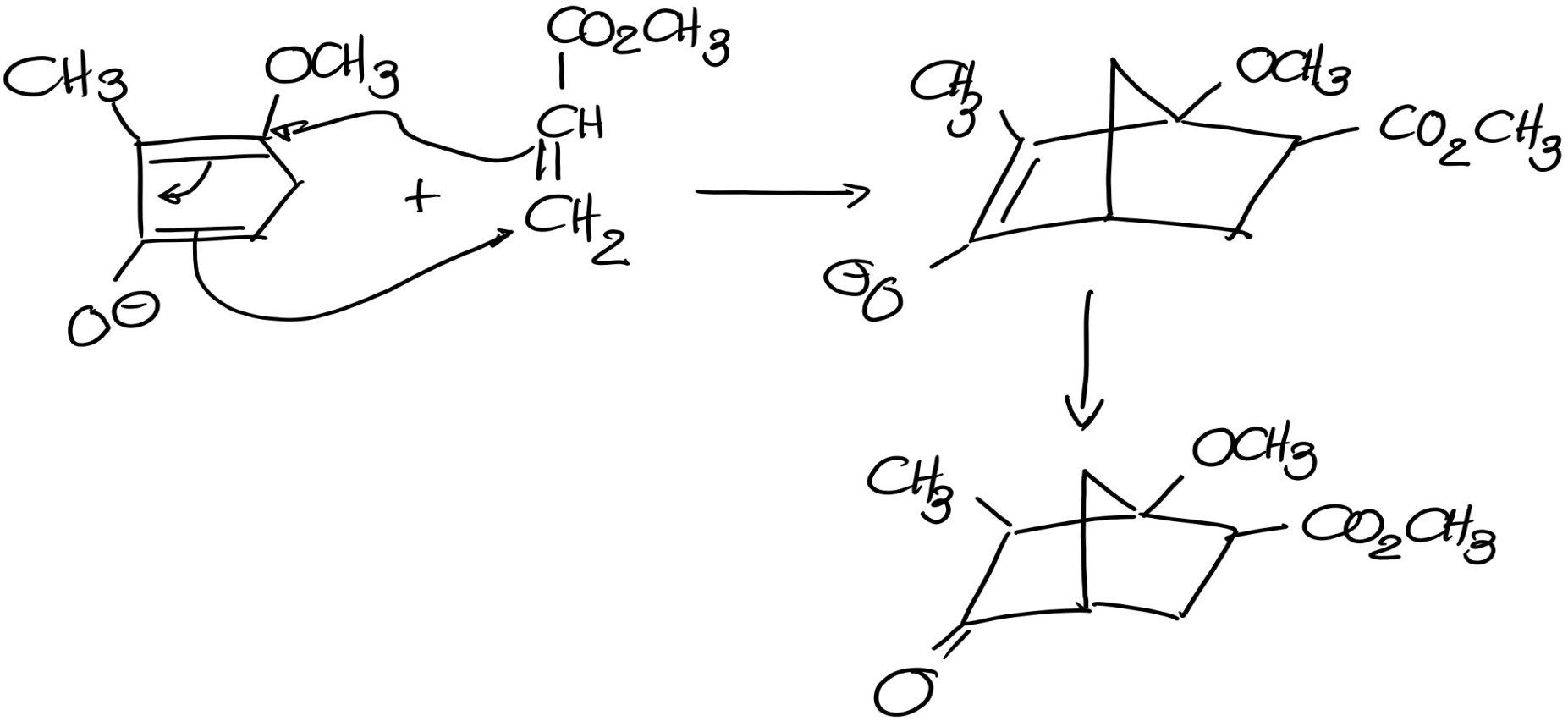


Δακτυλοποίηση Robinson

d. Reaction of the lithium anion of 3-methoxy-2-methylcyclopentanone with methyl acrylate gives the two products shown as an 82:18 mixture. Alkaline hydrolysis of the mixture gives a single pure product. How is the minor product formed and how is it converted to the hydrolysis product?




LDA
$CH_2=CHCO_2CH_3$
(διενόφιλο)
προσθήκη Michael
Diels-Alder
major


CH3
OCH3
CO2CH3
CH
CH2
+
O⊖
⊖O
CH3
OCH3
CO2CH3
CH3
OCH3
CO2CH3
O