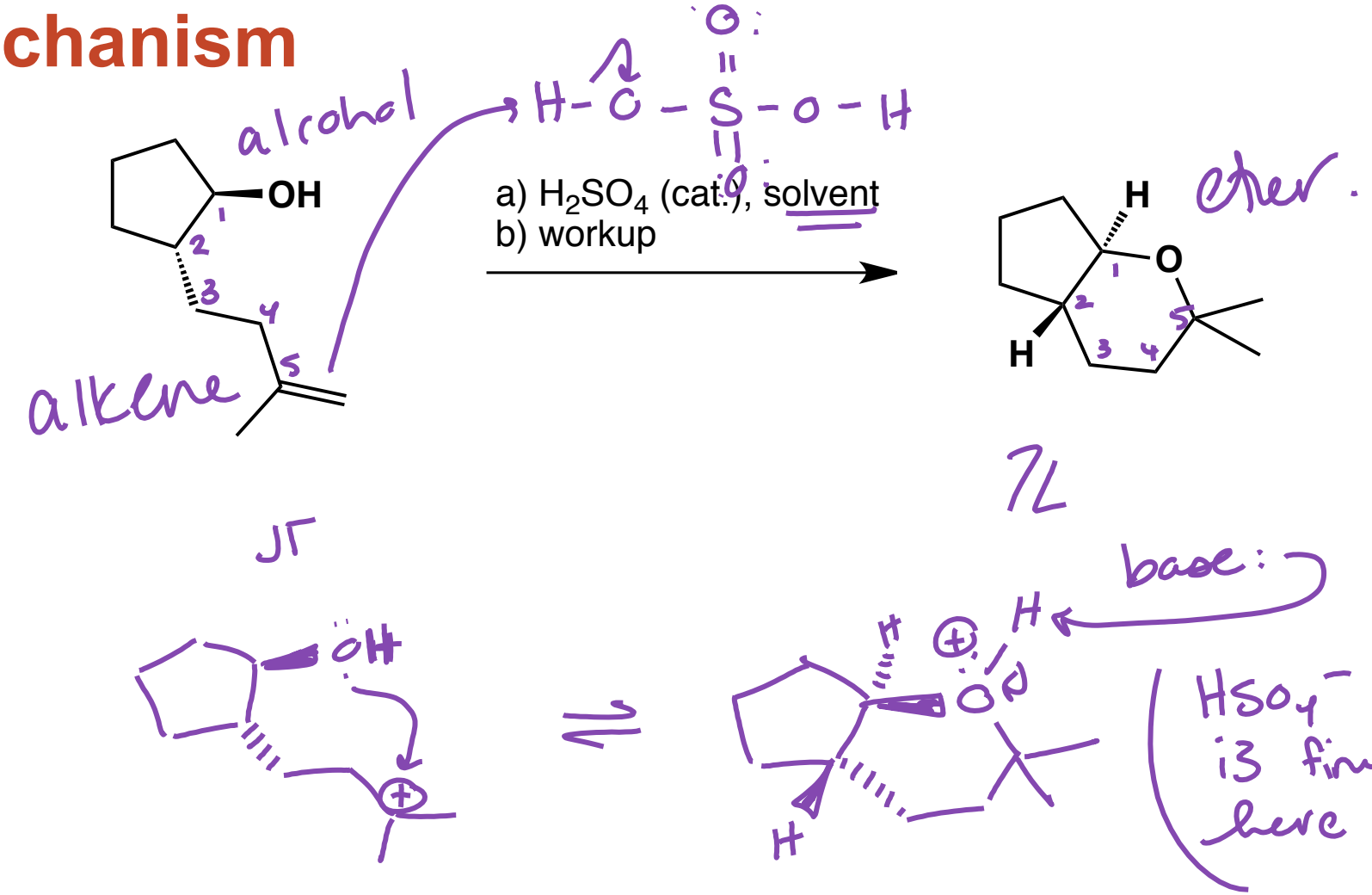
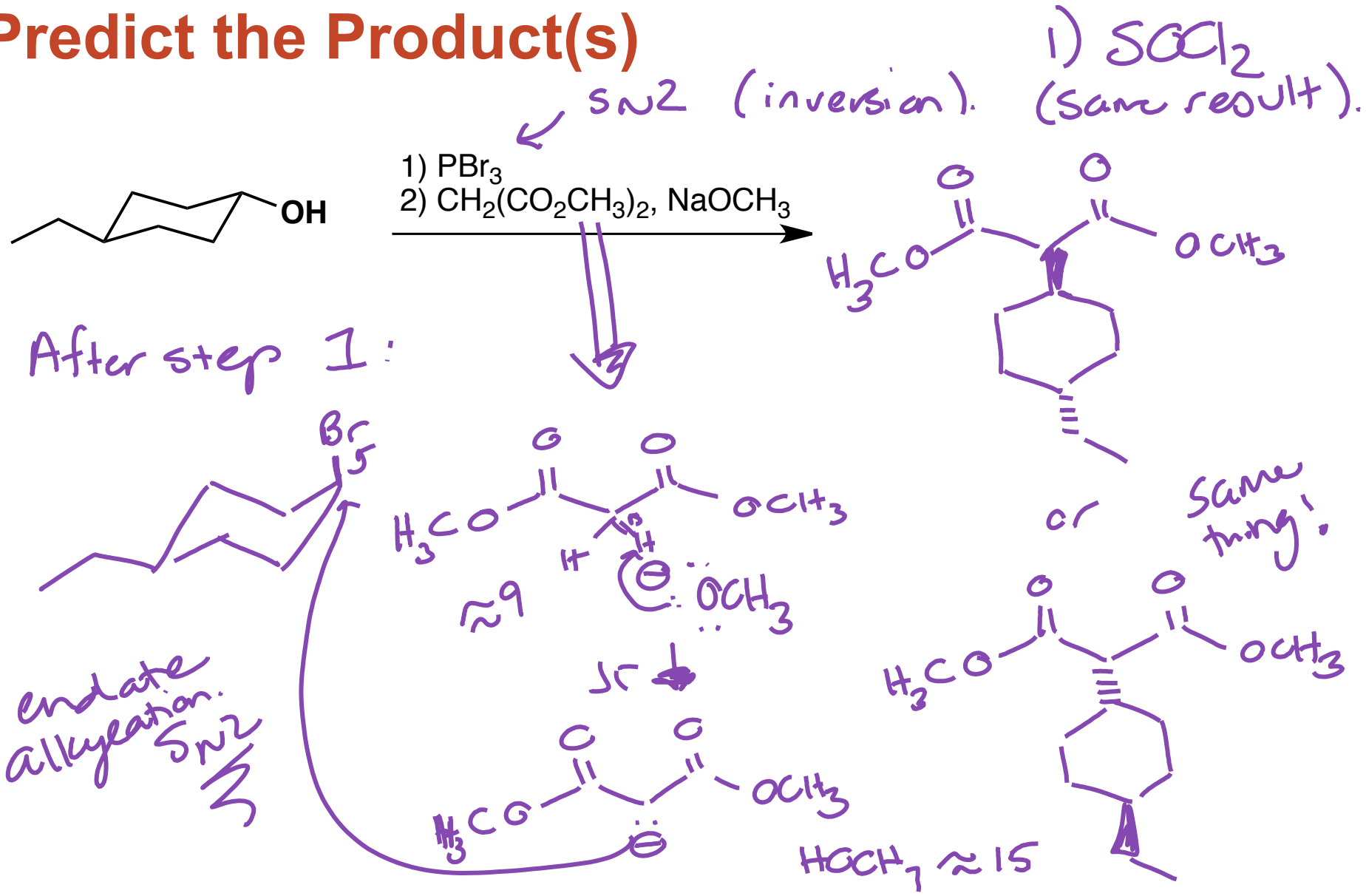
Problem Solving Strategies

- First – “represent” the problem!
  - Identify functional groups
  - Examine reagent(s)
  - Try to “match up” the carbon atoms
    - Are you changing the carbon skeleton of the structure?
    - What functional group conversions are occurring?
    - What are the dominant forms of chemical species (acid/base)
  - Try working backwards
- Check your work (charges, number of carbon atoms, acid/base considerations)

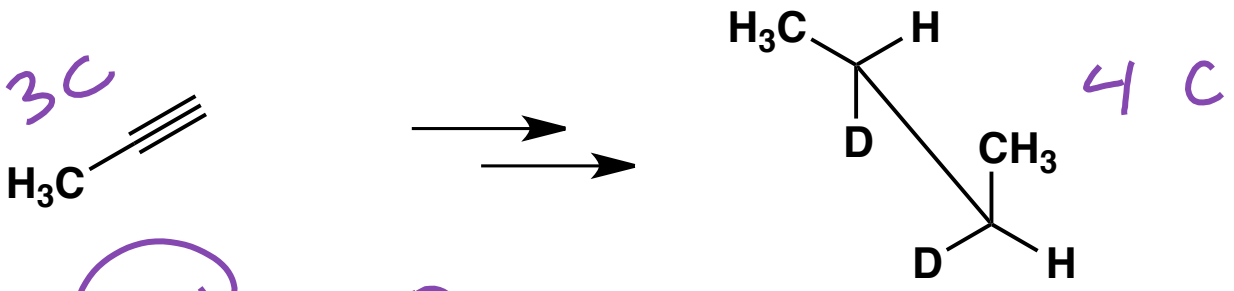
Mechanism


alcohol
OH
alkene
a) H_2SO_4 (cat.), solvent
b) workup
ether
base:
HSO_4^- is fine here
In H_2O? => same product.

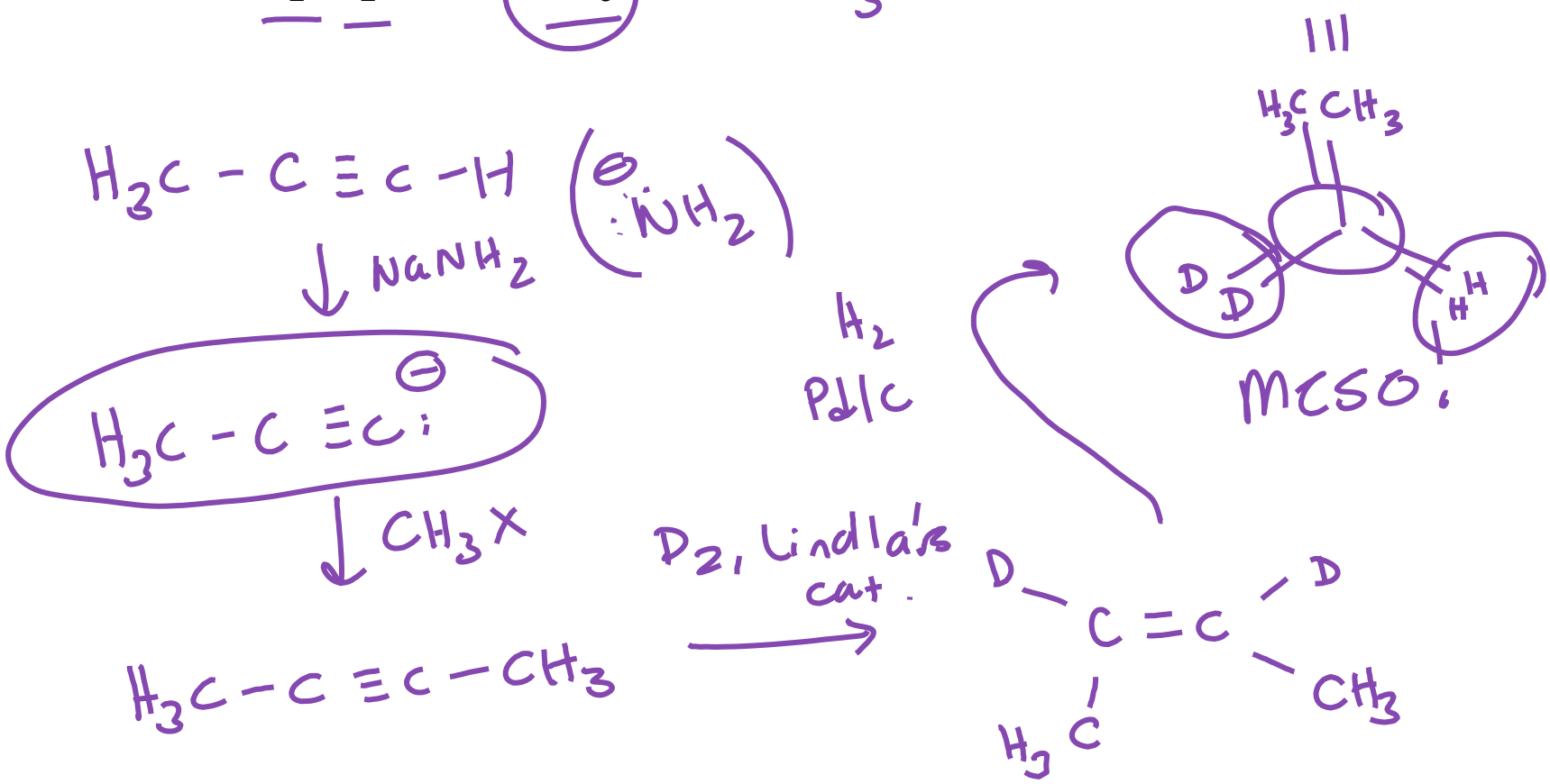
Predict the Product(s)

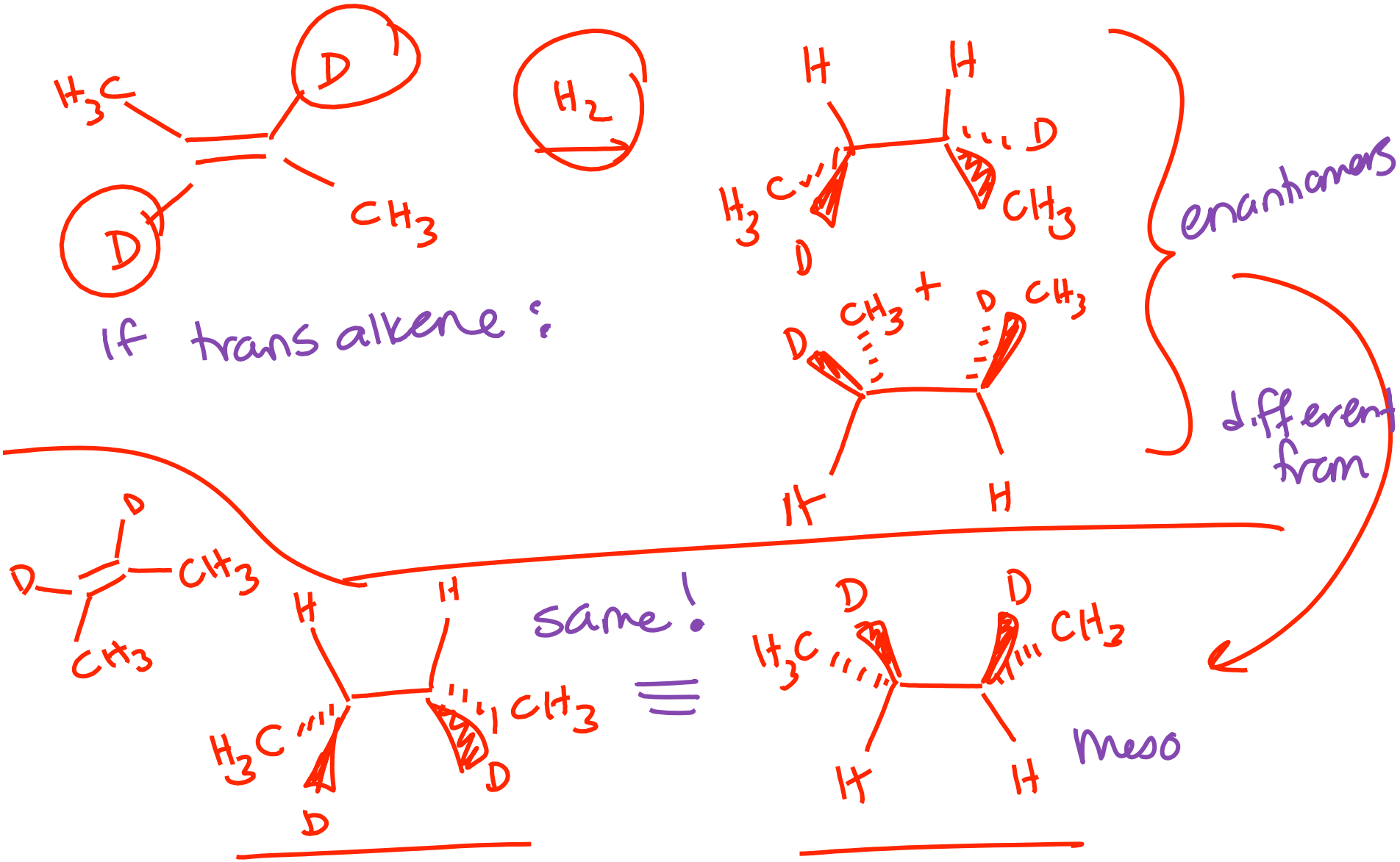


Synthesis

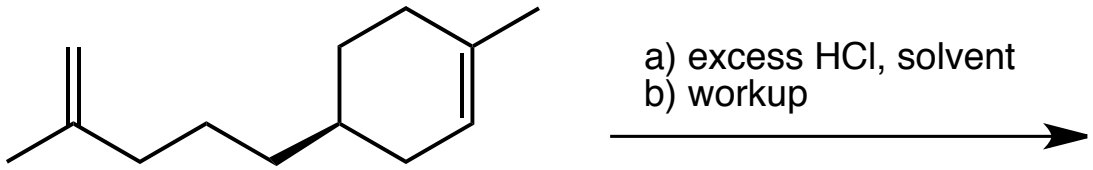


You may use H_2, D_2, and/or NH_3 no ND_3

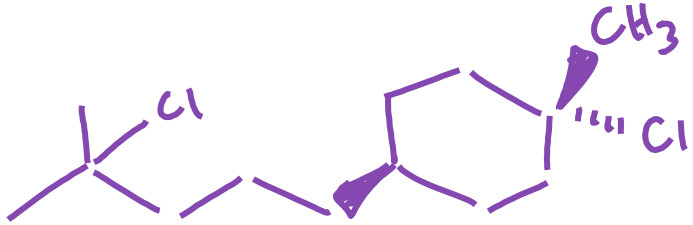


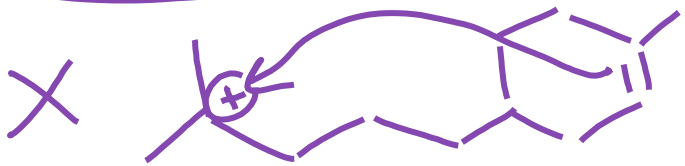

H3C
D
D
CH3
H2
If trans alkene:
H
H
D
H3C
D
CH3
+
CH3
D
D
CH3
H
H
enantiomers
different from
D
D
CH3
CH3
H
H
H3C
CH3
D
D
same!
D
D
CH3
H3C
H
H
meso

Predict the Product(s)



diastereomers

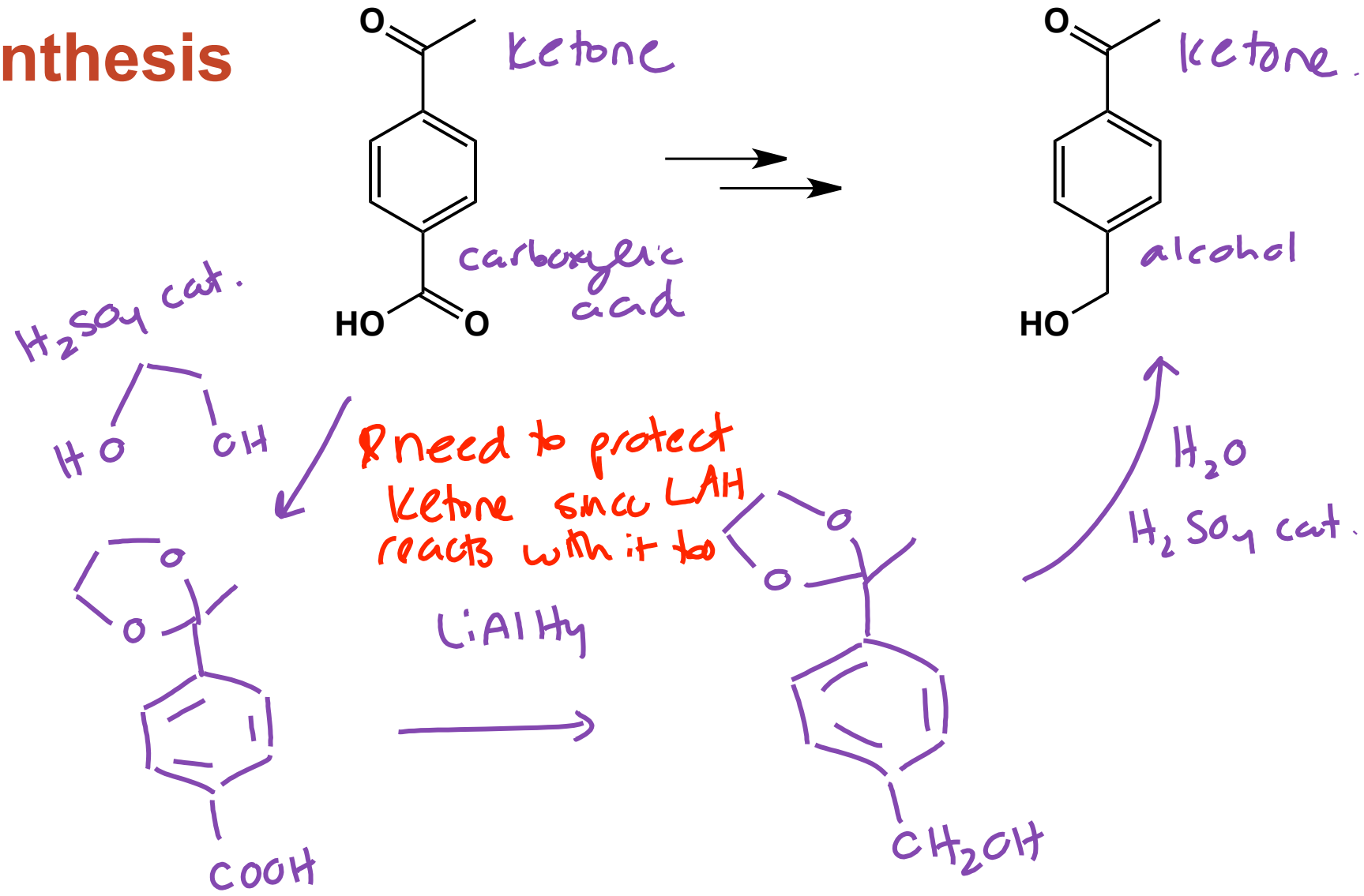




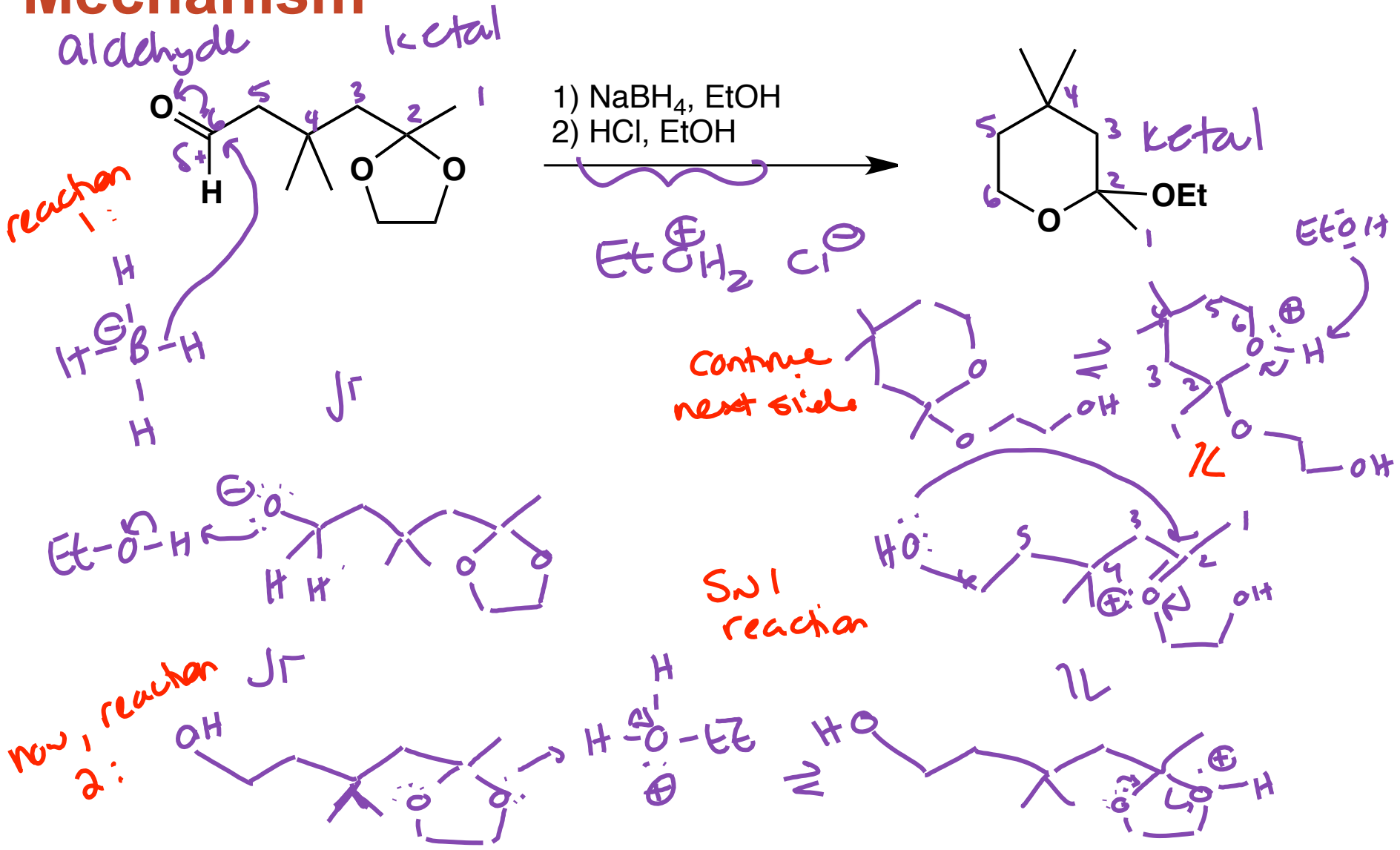
would form 7 or 8 membered ring.

* not as likely as intermolecular reaction

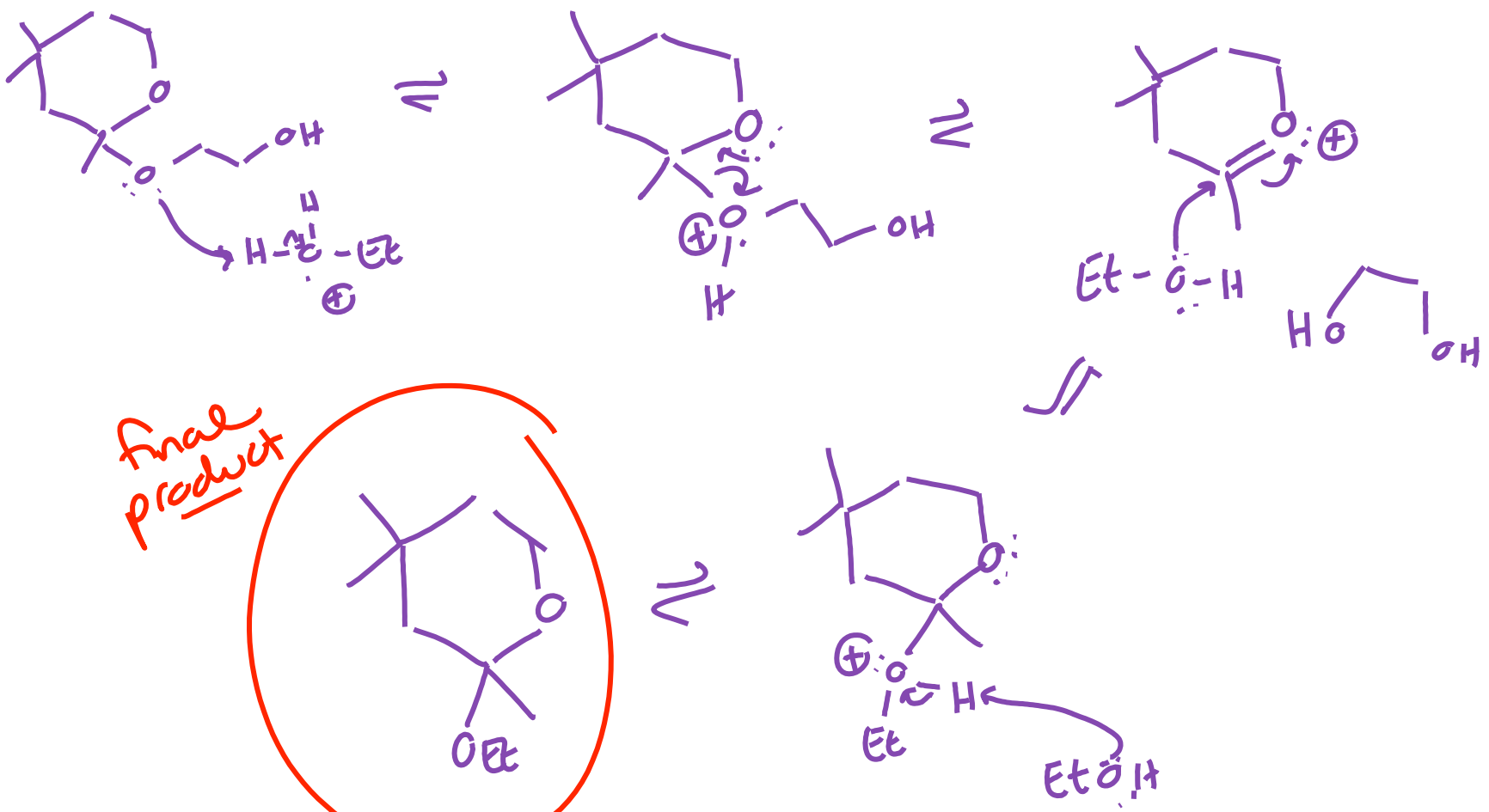
Synthesis


ketone
carboxylic acid
ketone
alcohol
H_2SO_4 cat.
need to protect ketone since LAH reacts with it too
$LiAlH_4$
H_2O
H_2SO_4 cat.
COOH
CH_2OH

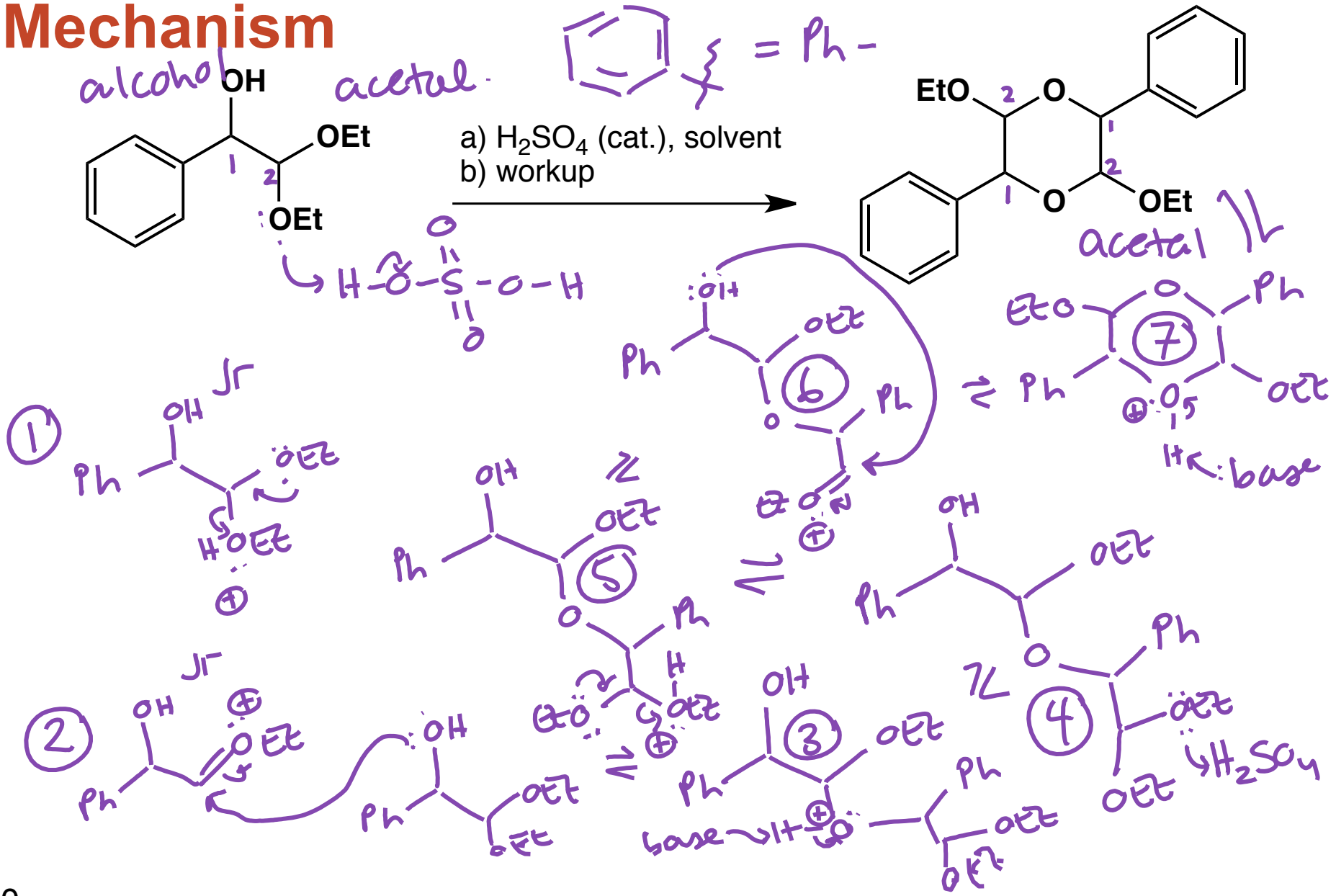
Mechanism


aldehyde
ketal
1) $NaBH_4$, EtOH
2) HCl, EtOH
ketal
OEt
reaction 1
continue next slide
SN1 reaction
now, reaction 2:

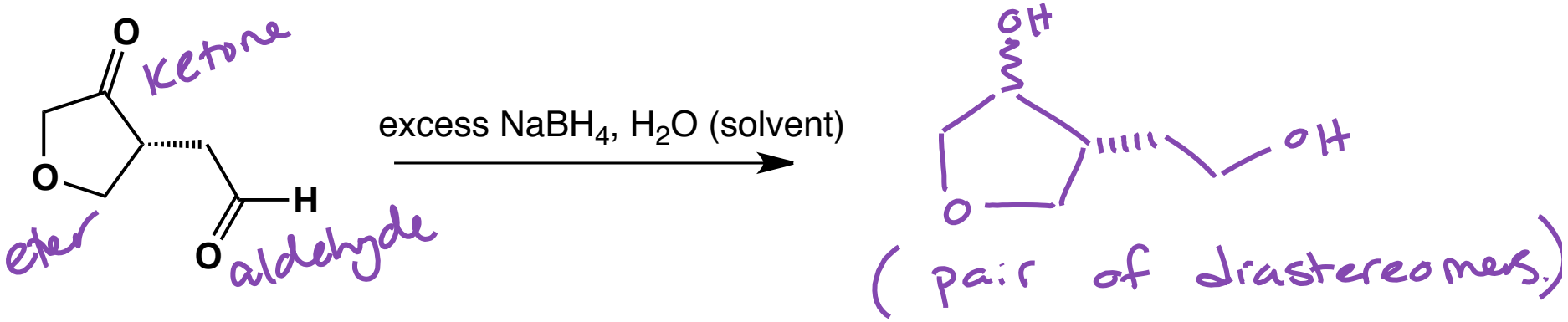
This is an S_N1 reaction.

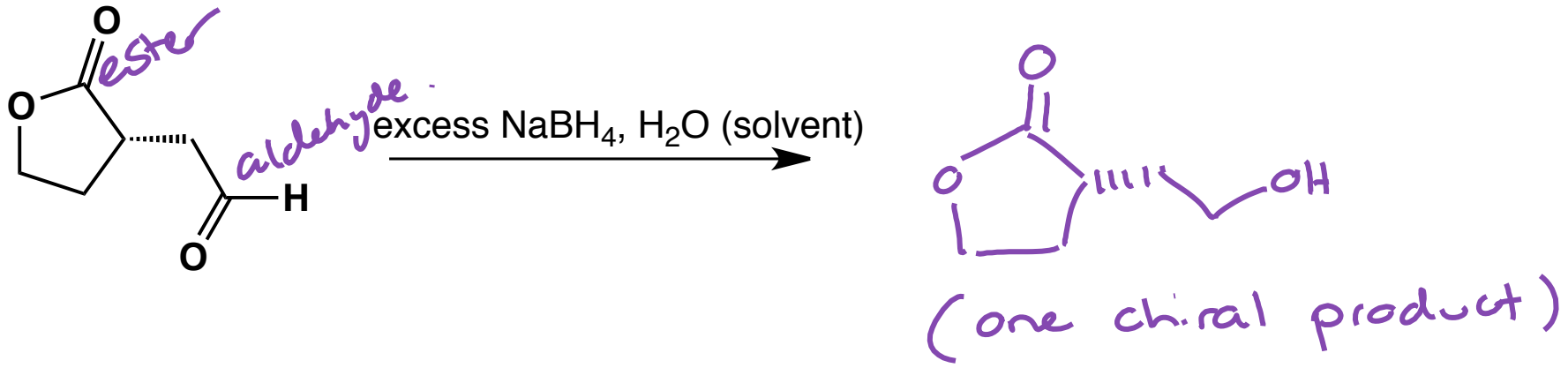


Mechanism


alcohol
acetal
= Ph-
OH
OEt
OEt
a) H_2SO_4 (cat.), solvent
b) workup
EtO
O
OEt
acetal
base
H_2SO_4

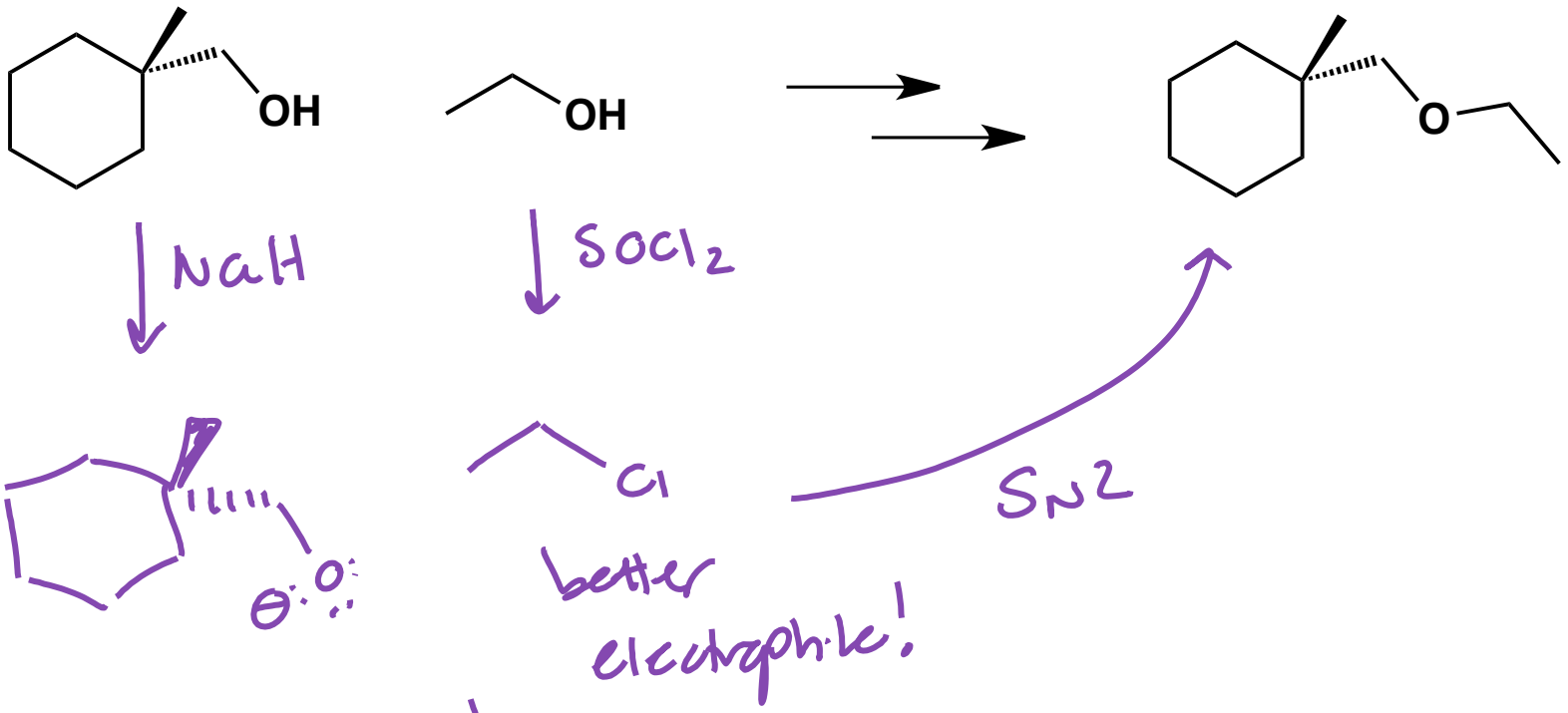
Predict the Product(s)





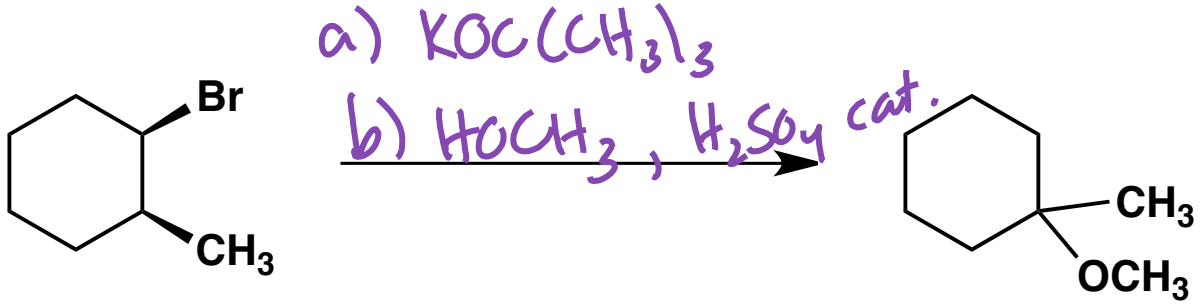
Synthesis

Sample solution

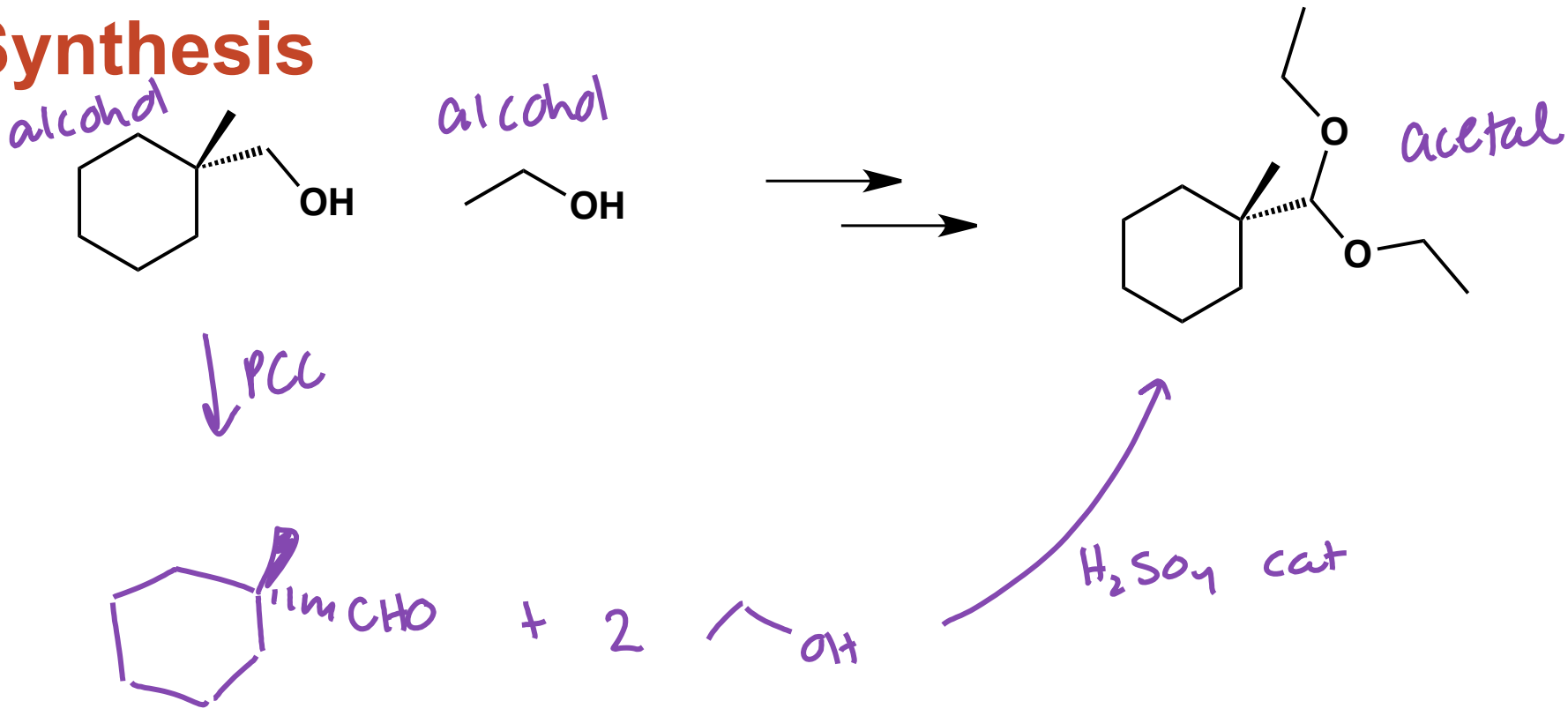


- remember S_N2 with 1° substrate + weak Nuc is really slow!

Provide the Reagent(s)

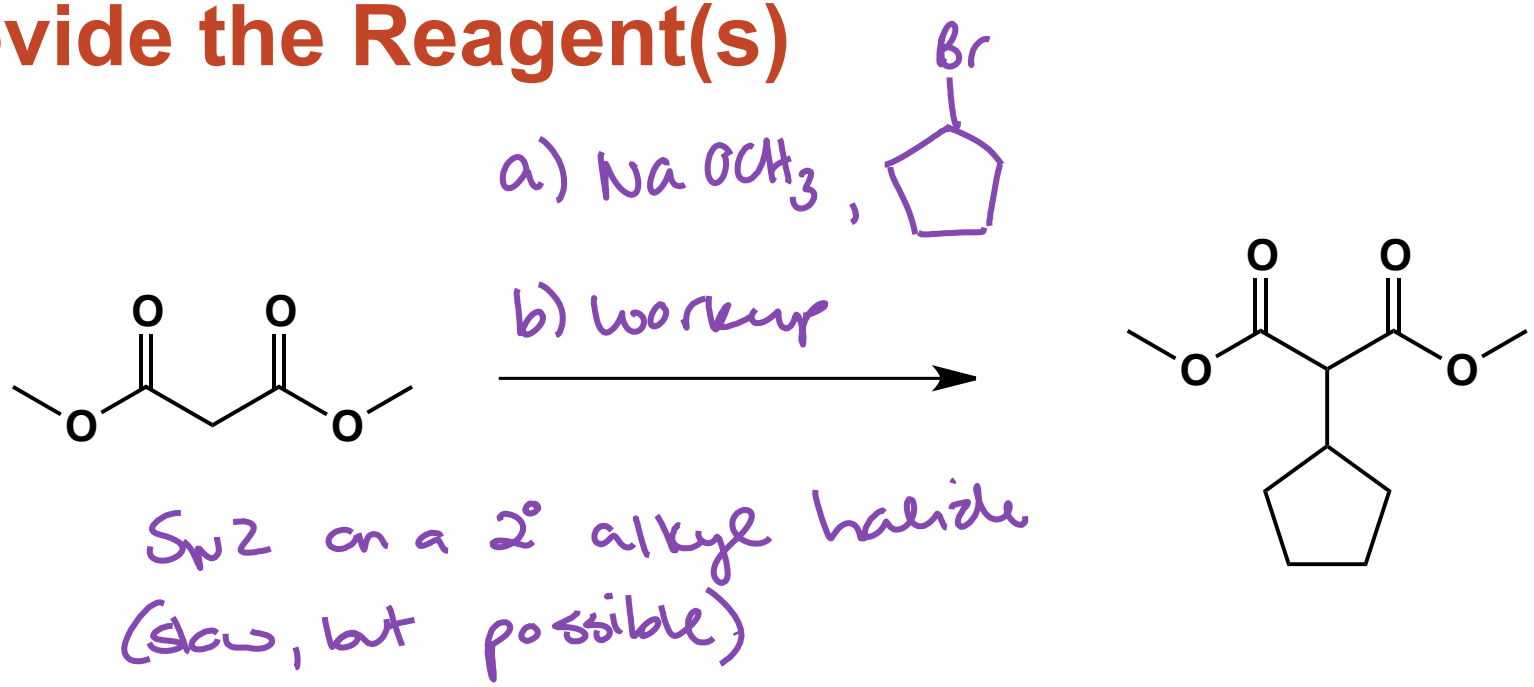


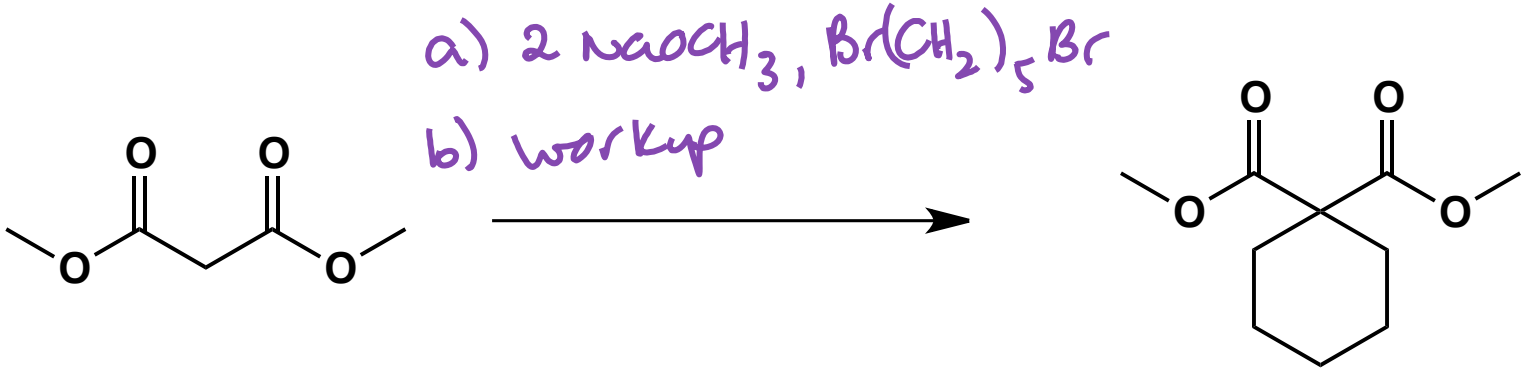
Synthesis



* to make an acetal, we need an aldehyde!

Provide the Reagent(s)





Synthesis