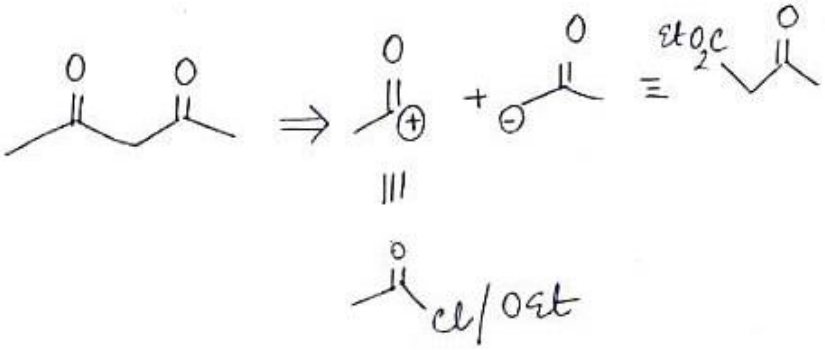
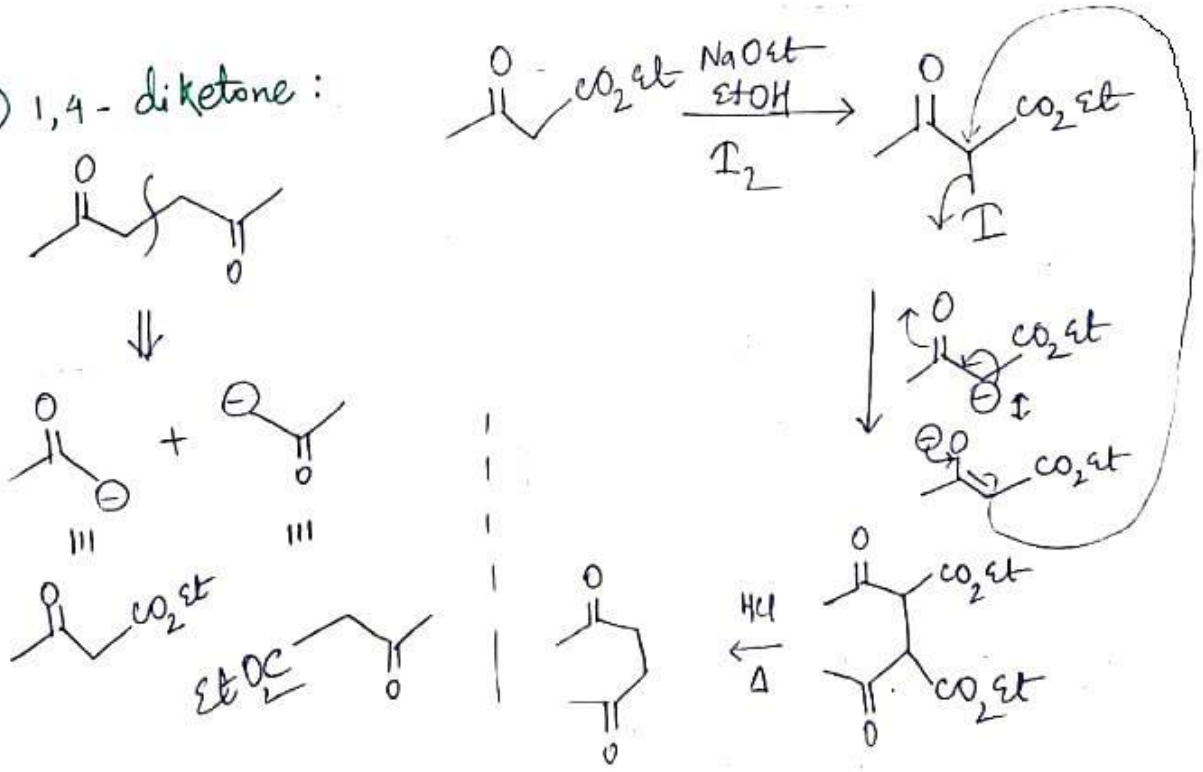
Different Approaches :-

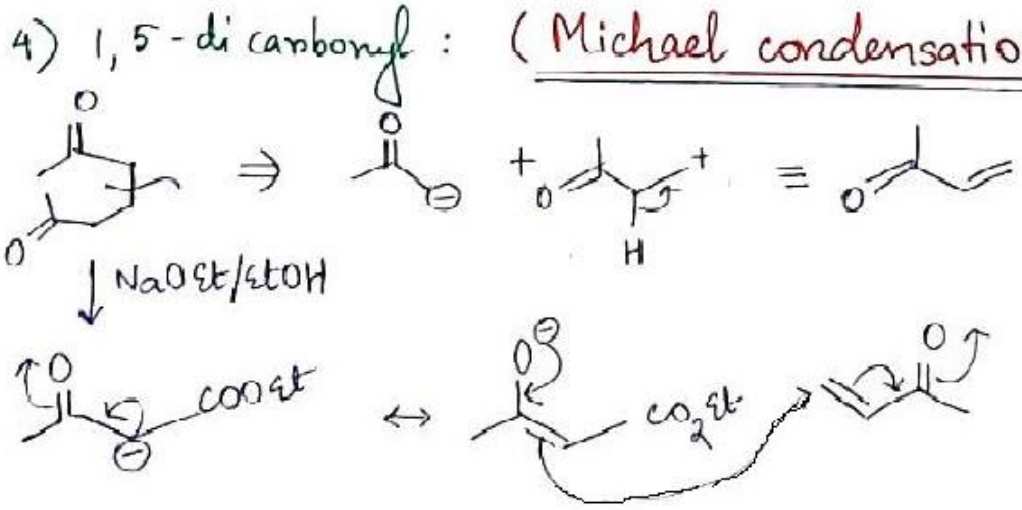
1) 1,2 - dicarbonyl : 

Reagent
SeO_2,
CrO_3/Py

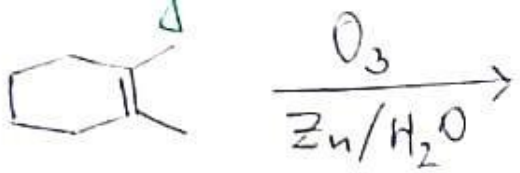
2) 1,3 - diketone : 

3) 1,4 - diketone : 

4) 1, 5 - di carbonyl : (Michael condensation)



5) 1, 6 - dicarbonyl :



6) To get β - keto ester :

$\Rightarrow CH_3-COOEt$ + EtOH/NaOEt

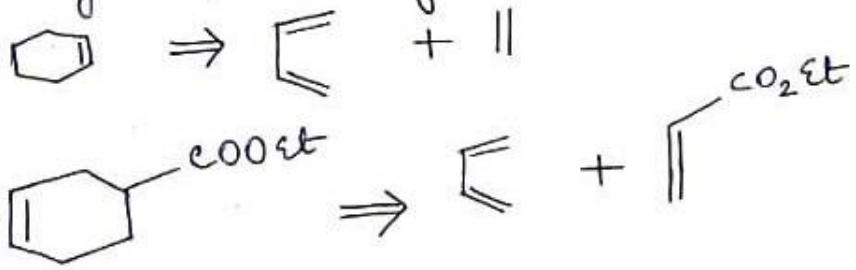
Claisen condensation.

7) α, β unsaturated carbonyl :
Aldol, Knoevenagel, Claisen-Smidt.

8) α, β unsaturated carbonyl having terminal double bond. — Manich rxn.

9) γ, δ unsaturated carbonyl : Try Claisen rearrangement.

10) For cyclohexene, try <u>diels alder</u> rxn.



11) Anhydride : Diacid.

malic acid $\xrightarrow{\Delta}$ malic anhydride.

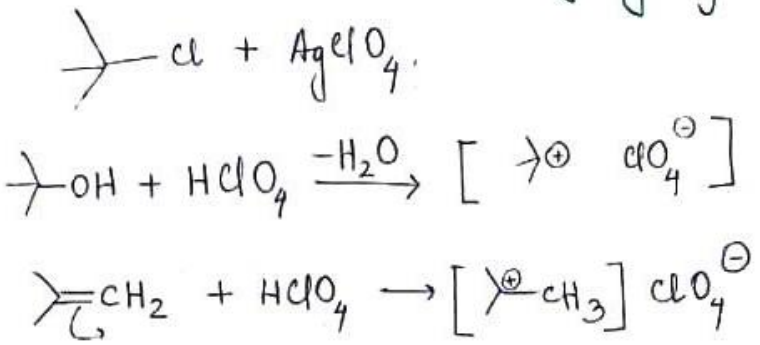
12) Lactone : corresponding hydroxy acid.

13) Half ester : corresponding anhydride.

(anhydride + alcohol) ⇒ half ester

14) Phenylation : Try with benzene.

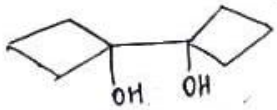
15) Introduction of 3rd alkyl group :



16) Acetal : Carbonyl compound + alcohol.

17) 1°/2° alkylation : alkyl halide

18) Spiro ring having n and (n+1) number of carbon atom, try pinacol - pinacolon rearrangement.

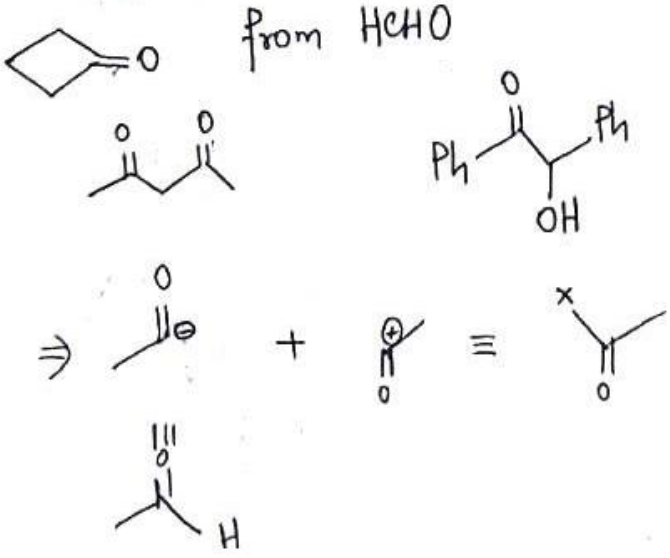


19) For 1,2 - diol : Corresponding alkene $\xrightarrow[\text{or } KMnO_4 \text{ (alkaline)}]{OsO_4}$

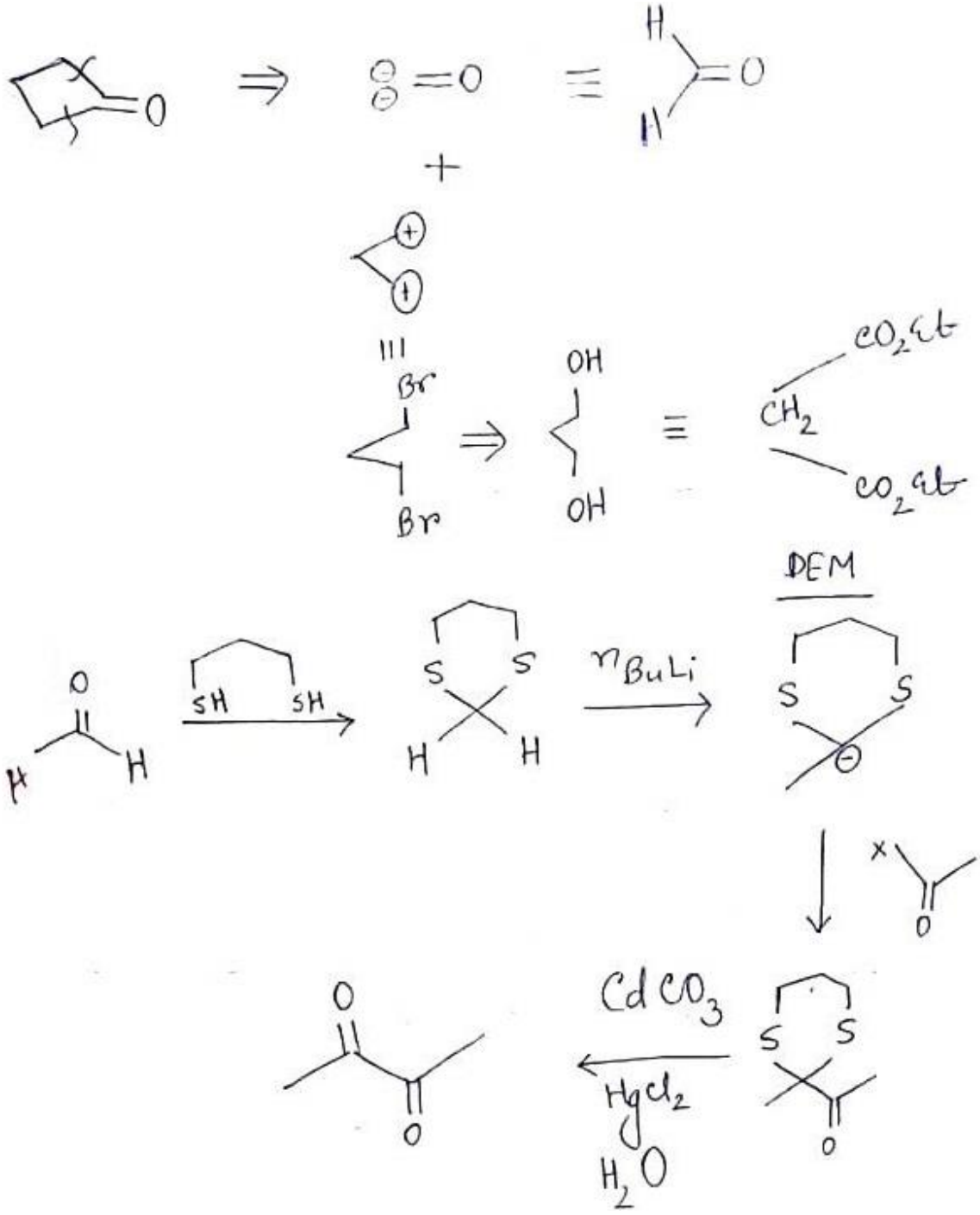
20) Alkene : Wittig rxn

21) α,β - unsaturated ester : Reformatsky rxn.

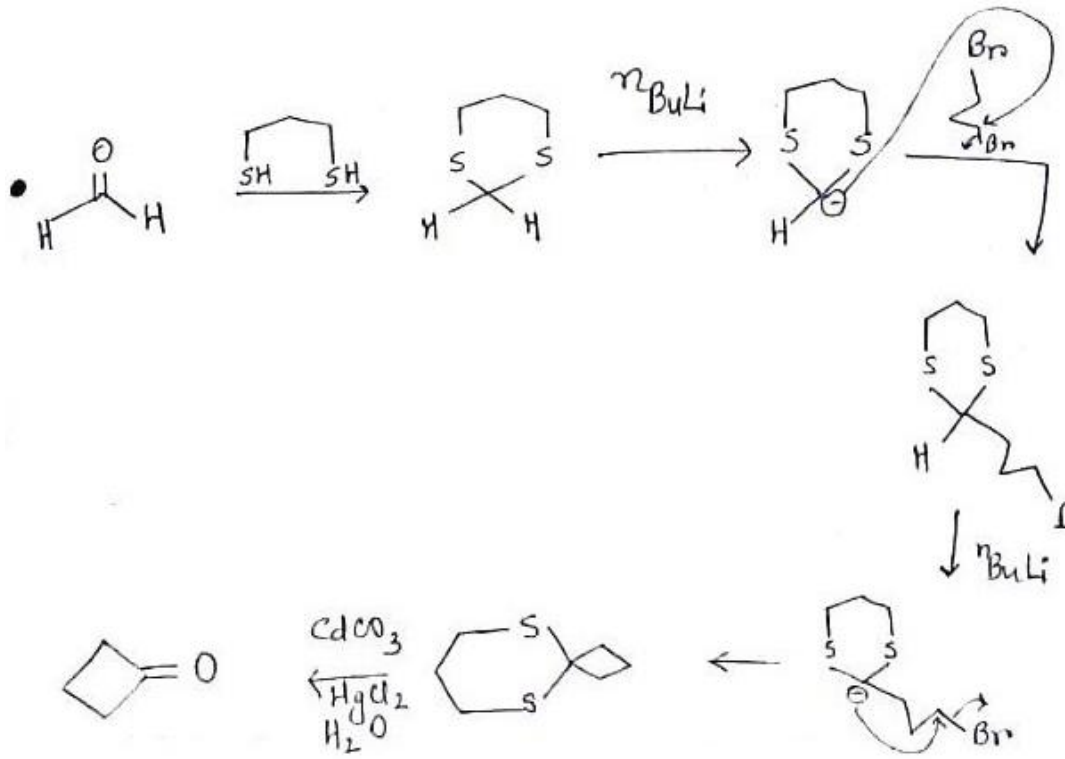
22) Umpolung synthesis :

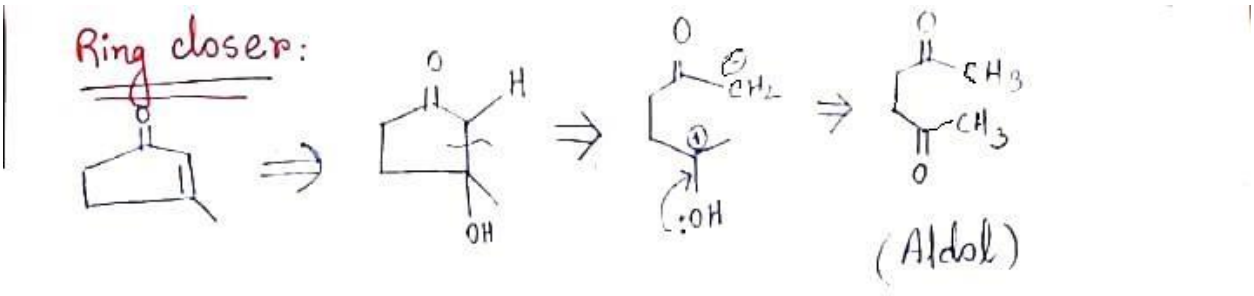


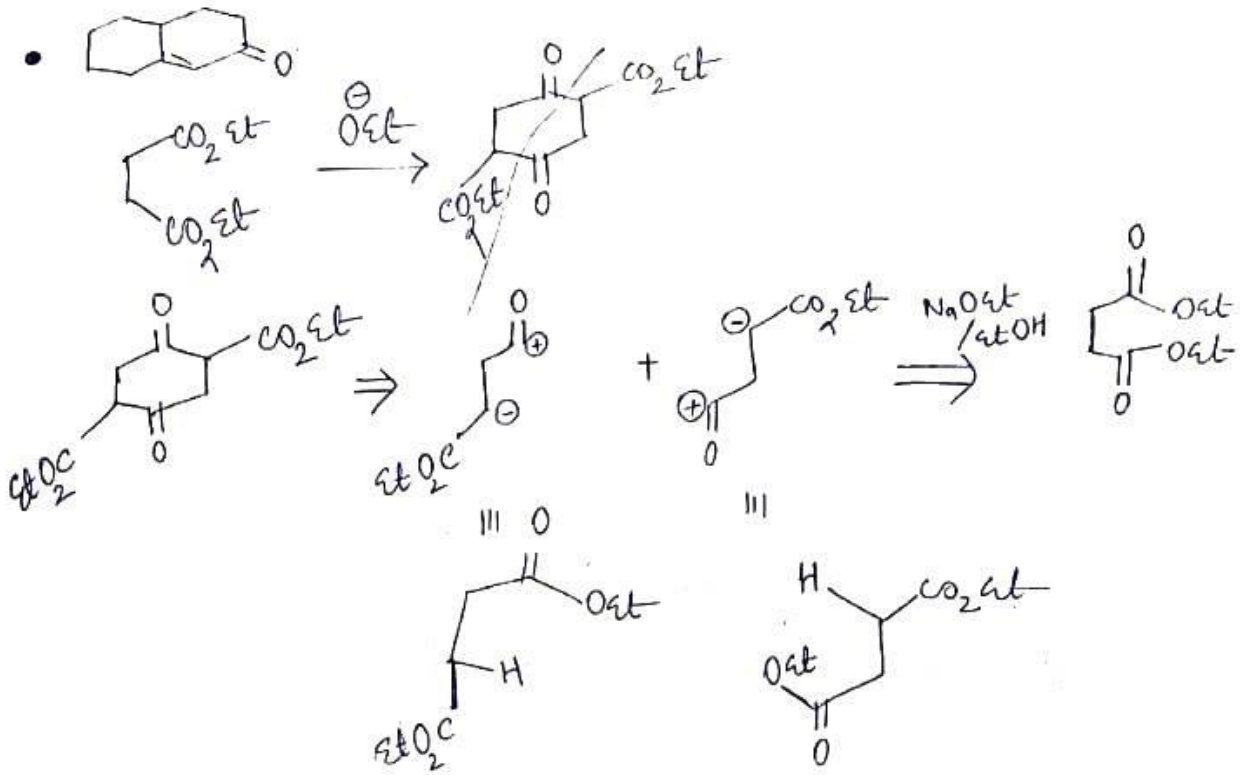
Sayanwita Panja/ B.Sc/ Chemistry (H)/ Sem-IV/ CC10/ The logic of Organic Synthesis

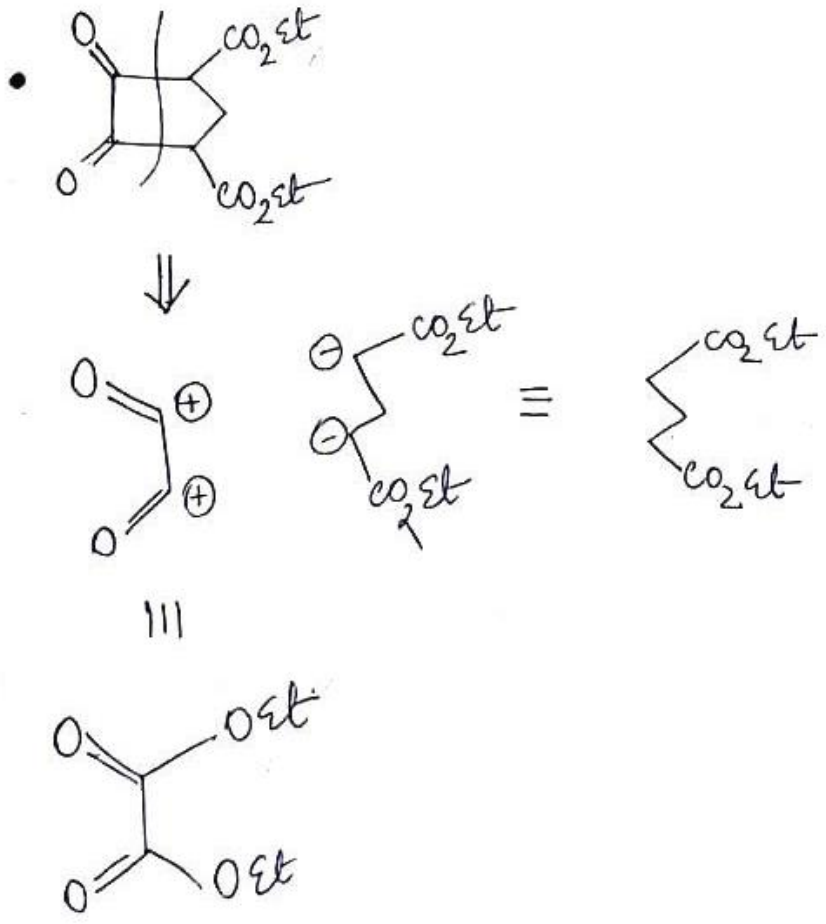


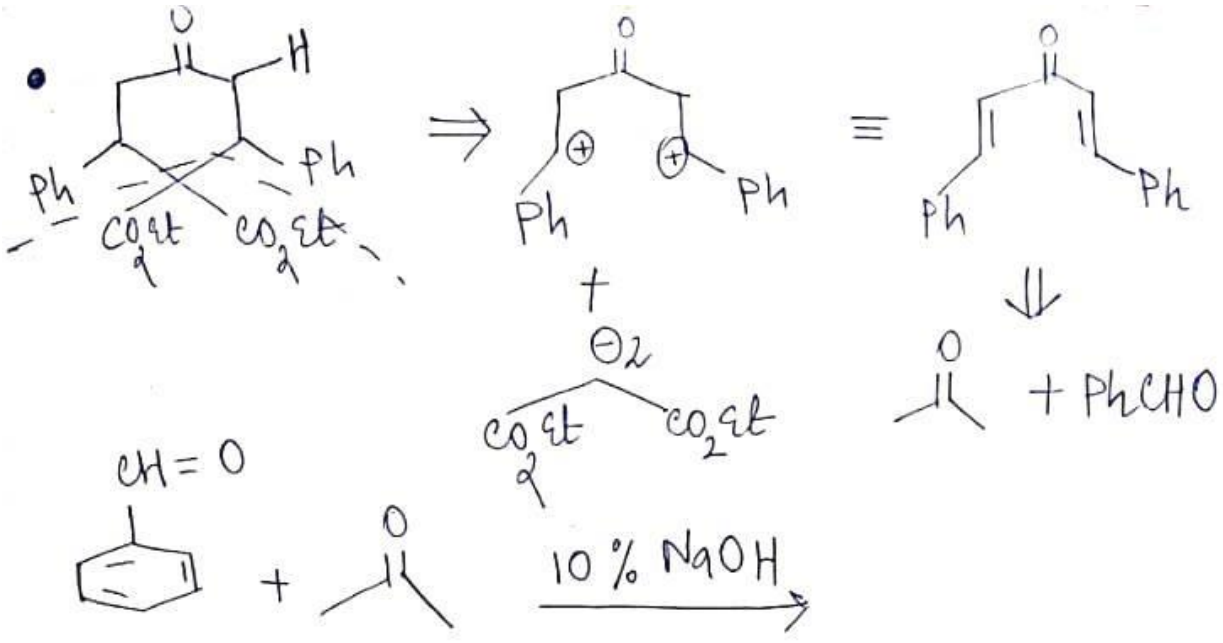
Sayanwita Panja/ B.Sc/ Chemistry (H)/ Sem-IV/ CC10/ The logic of Organic Synthesis



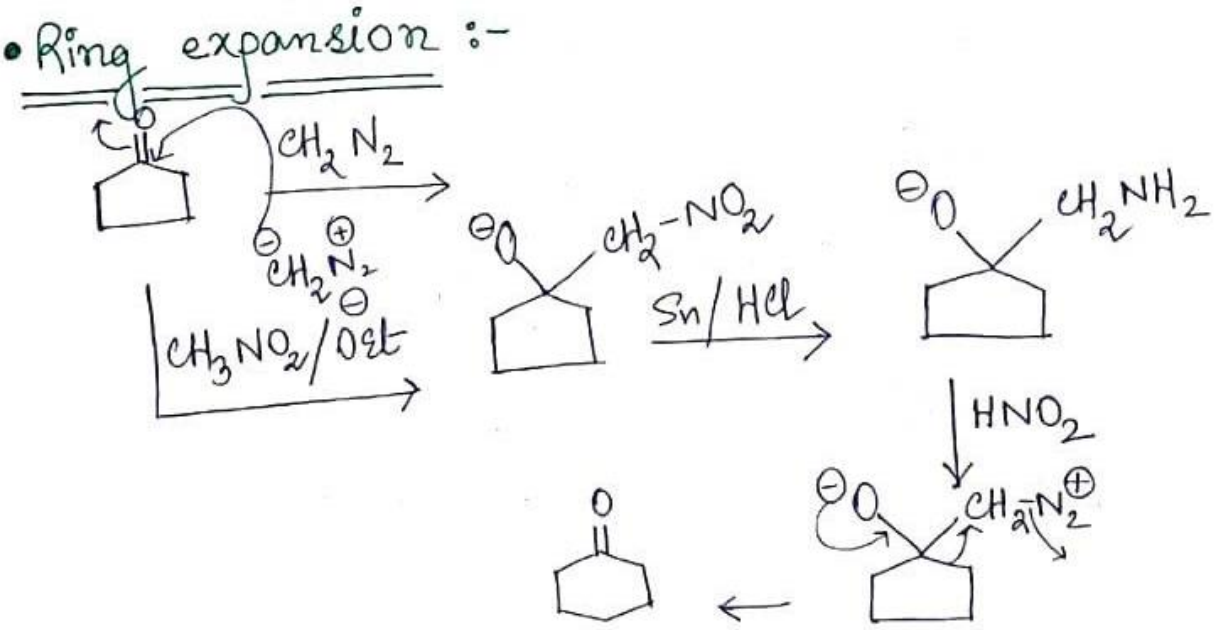






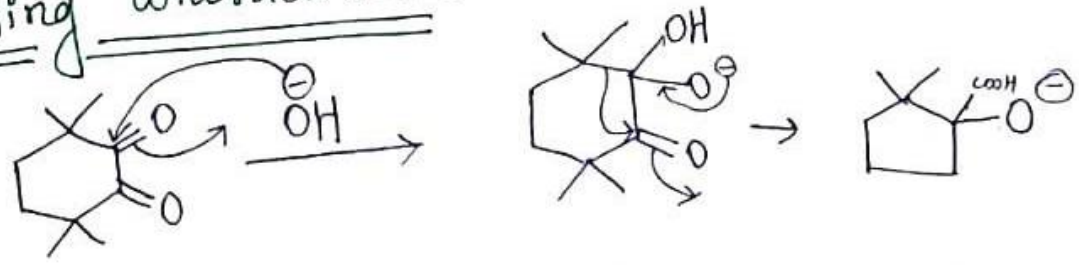


- Ring expansion :-

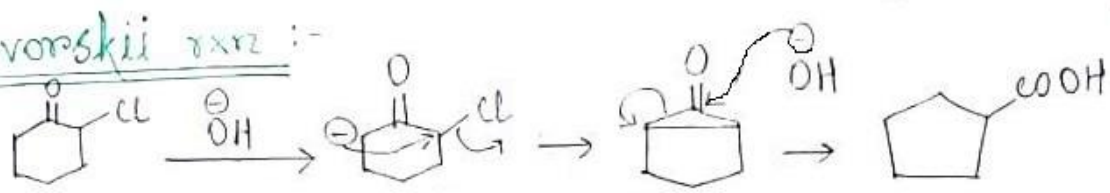


- Baer. Viliger. oxidation
- Backmann
- pinacol - pinacolon.

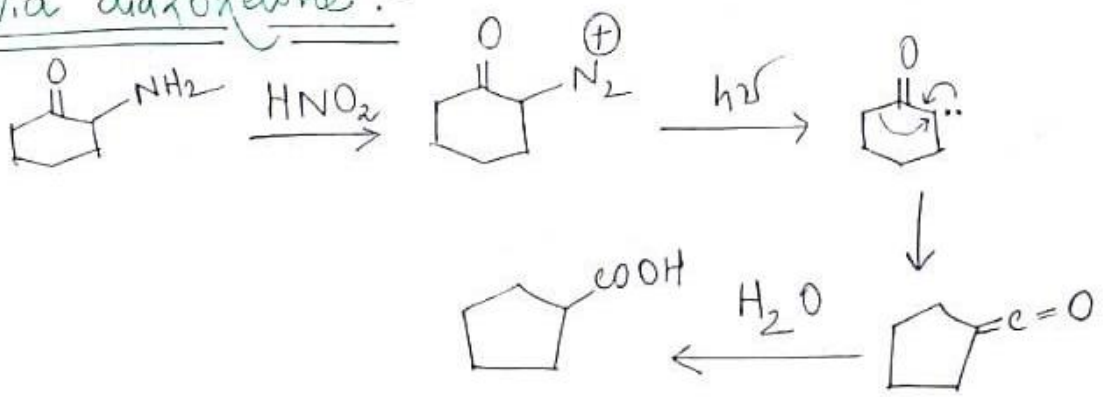
- Ring contraction :-



- Favorskii rxn :-



- Via diazoketone :-



Protection and deprotection :-

This is required for poly functional molecule when choice of selective reagent is not sufficient to attack other functional group present in the poly functional molecule. So, during the functional gr. interconversion or C-C bond formation in the process of synthesis, protection is necessary.

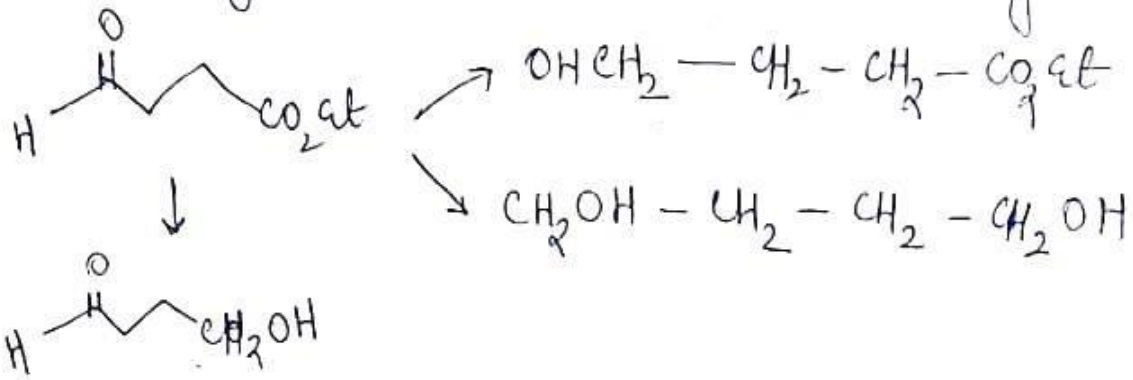
Nature of protecting group :-

1) The reagent for protecting gr. must be easily available and stable.

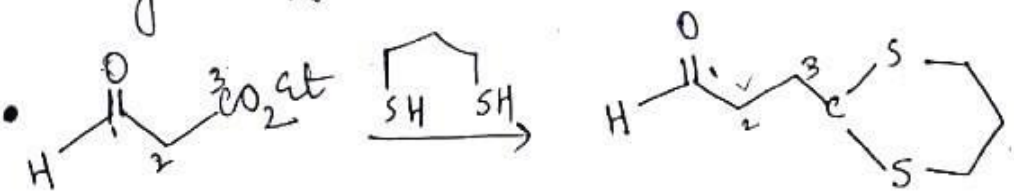
2) The reagent should not posses or introduce a chiral centre in the molecule.

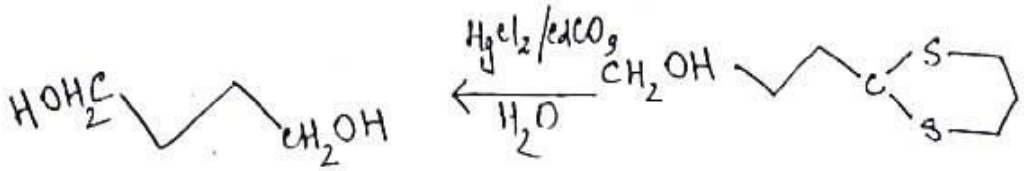
3) The protecting gr. must be stable throughout the required rxn sequence.

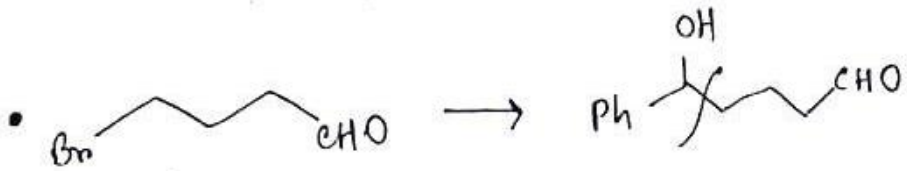
4) After desired rxn, the protecting gr. should be easily removed from the function gr.



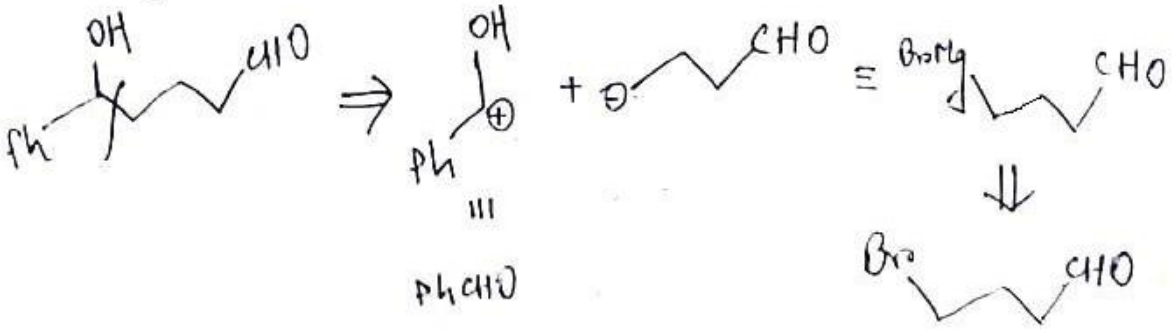
$LiAlH_4$ দিলে হলেই reduction হবে এমন নয়,
$NaBH_4$ দিলে alcohol reduction হবে, ester gr. হবে না।

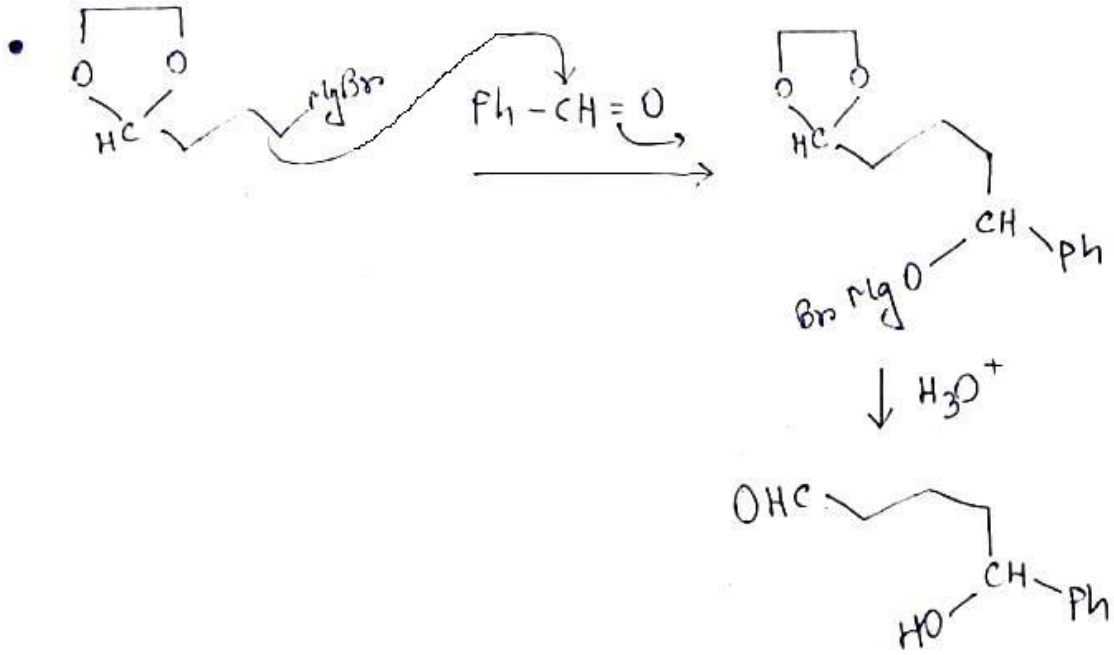
- 

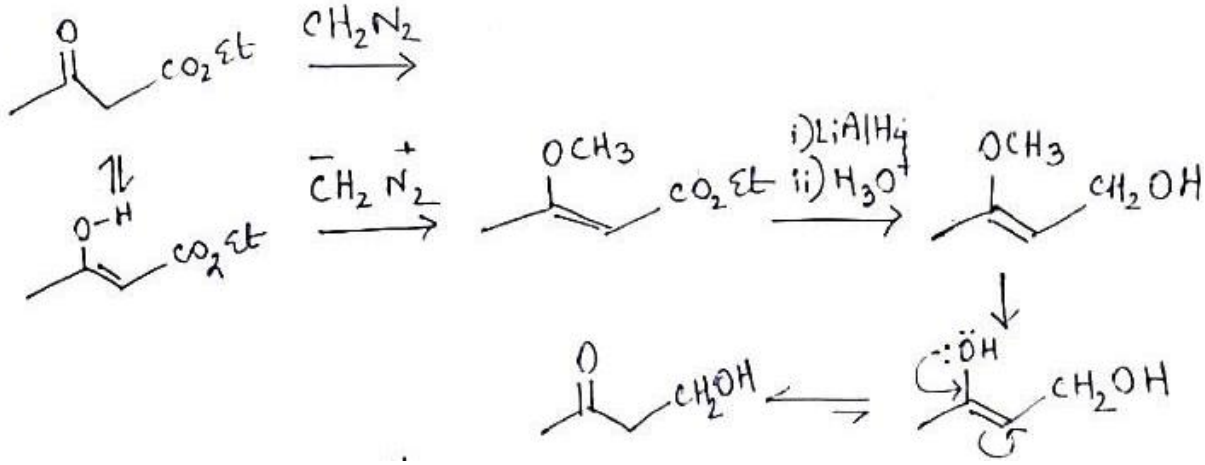


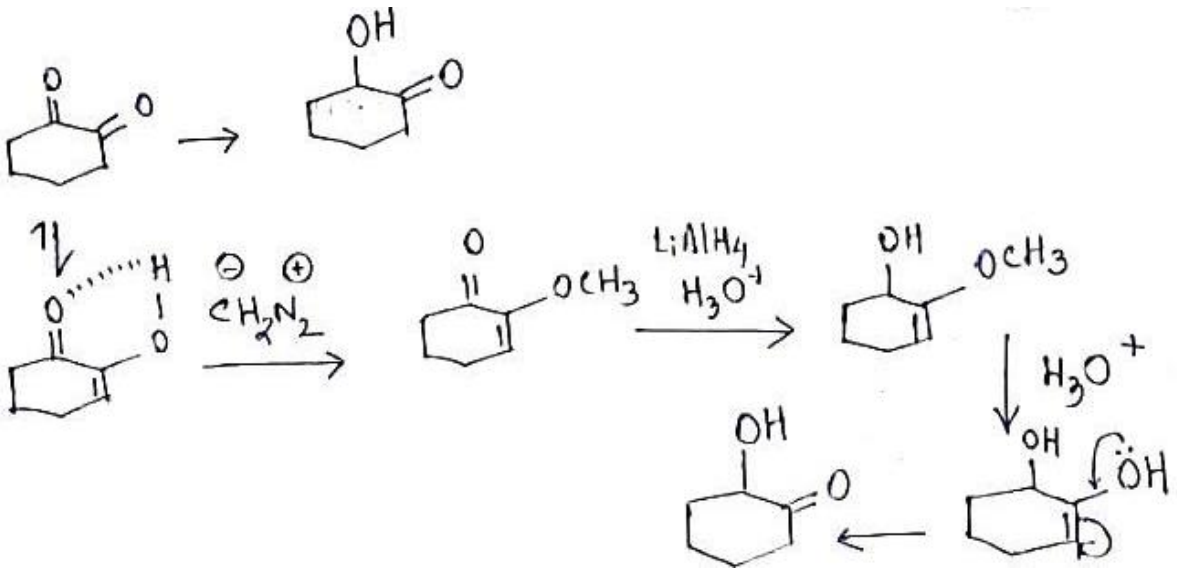


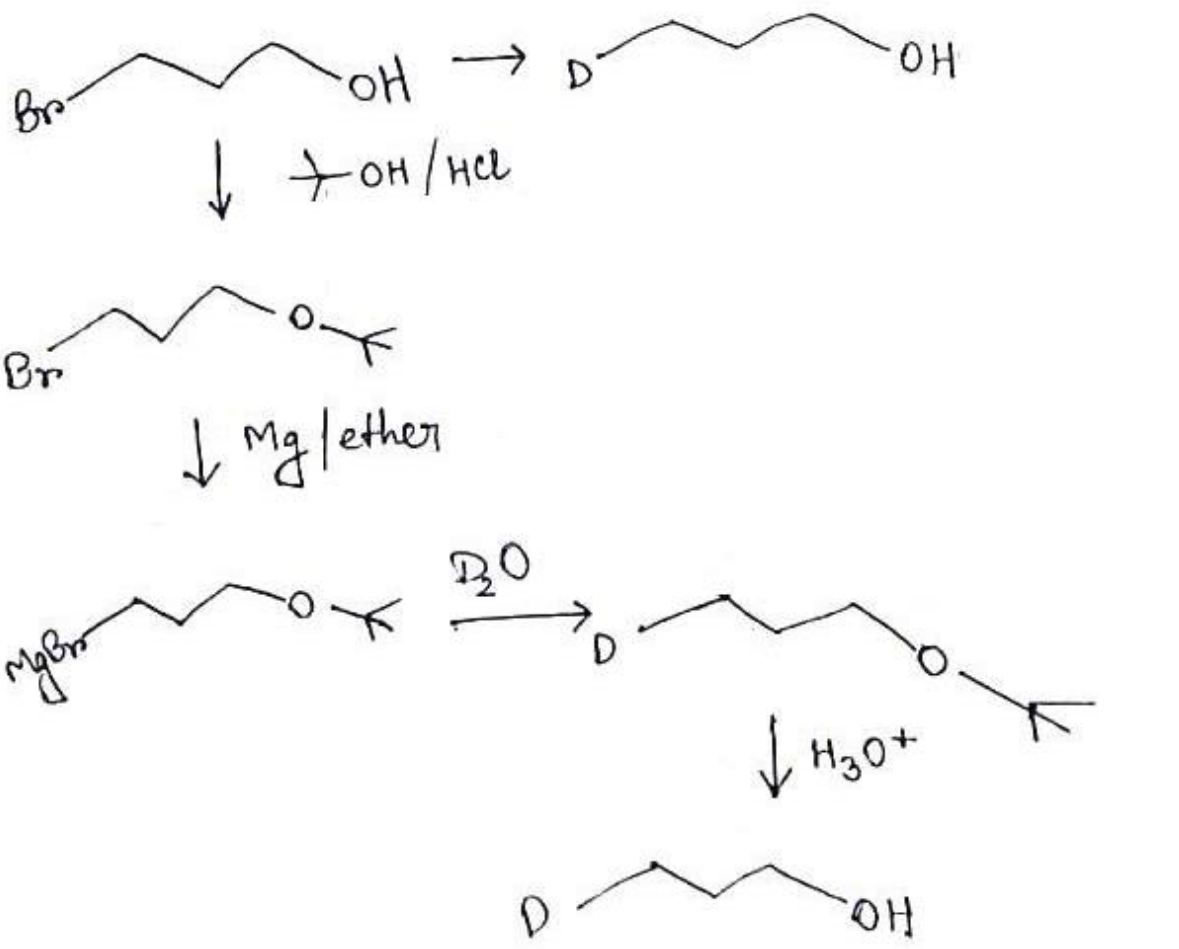
Alkyl → ⊖ve ⇒ Grignard reagent.

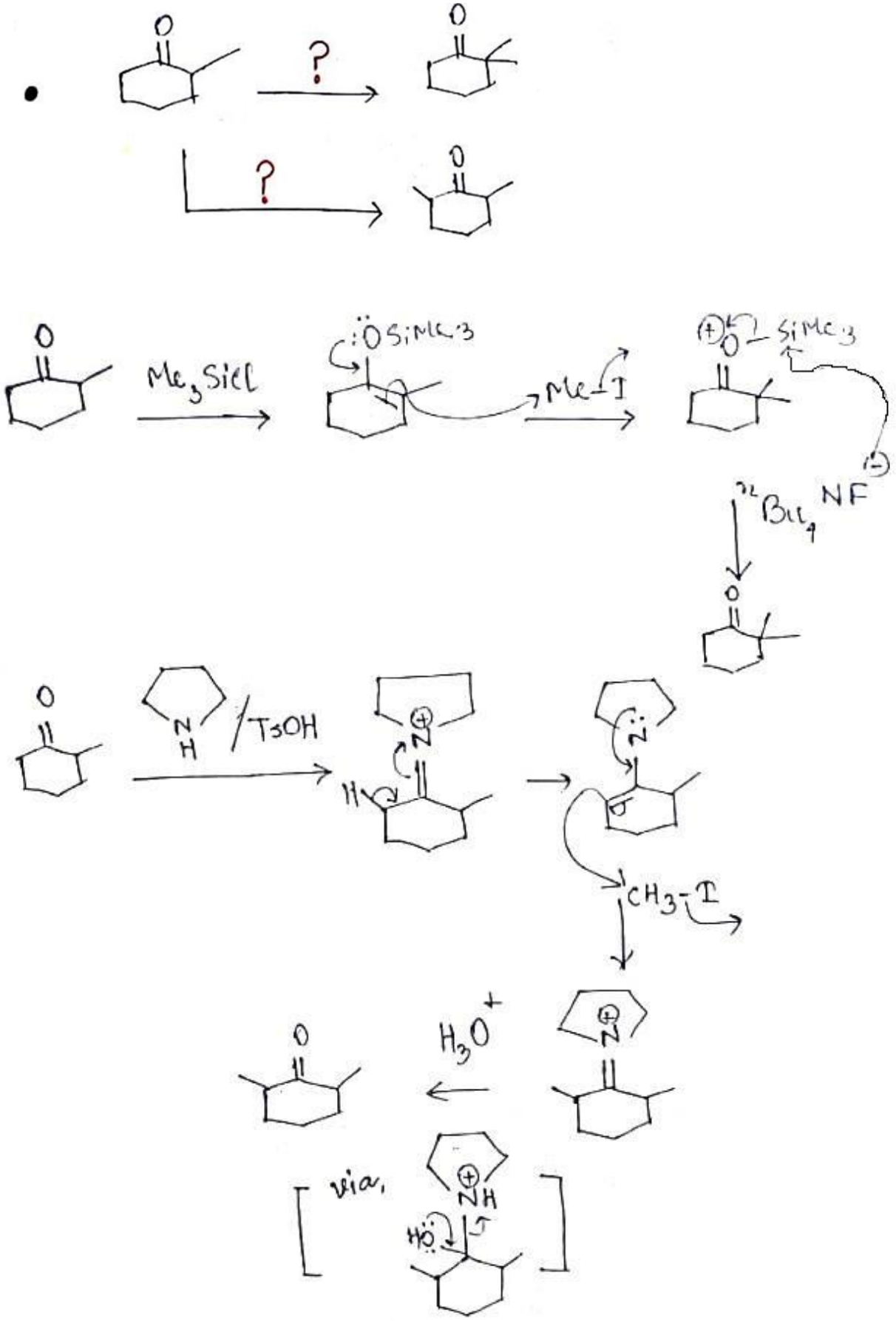


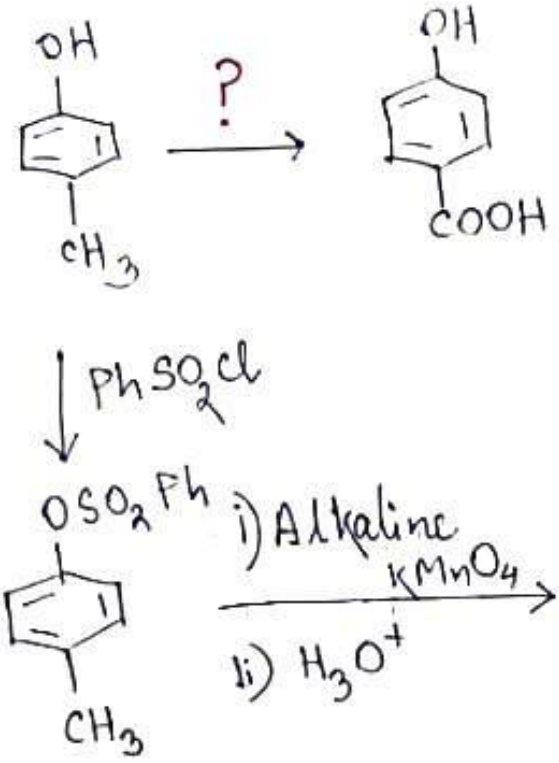


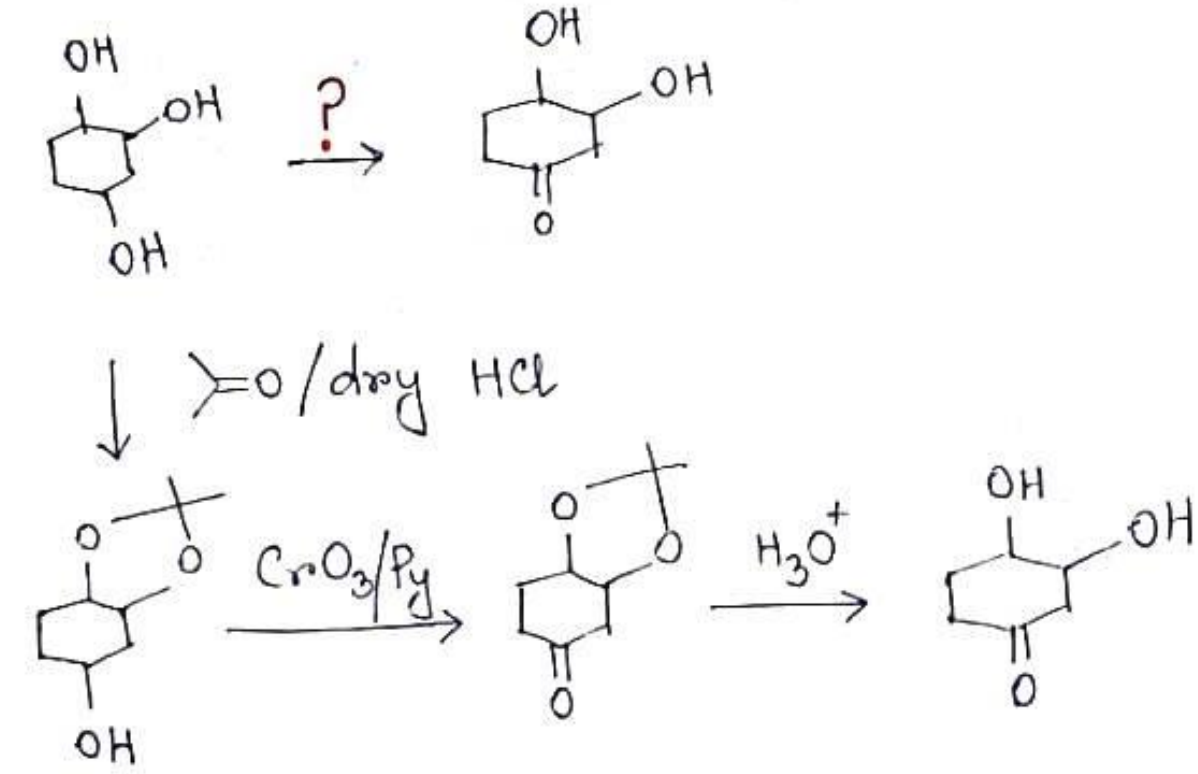


- 
OH
O
O
H
O
O
CH_2N_2
OCH3
$LiAlH_4$
H_3O^+
OH
OCH3
H_3O^+
OH
OH
O
OH

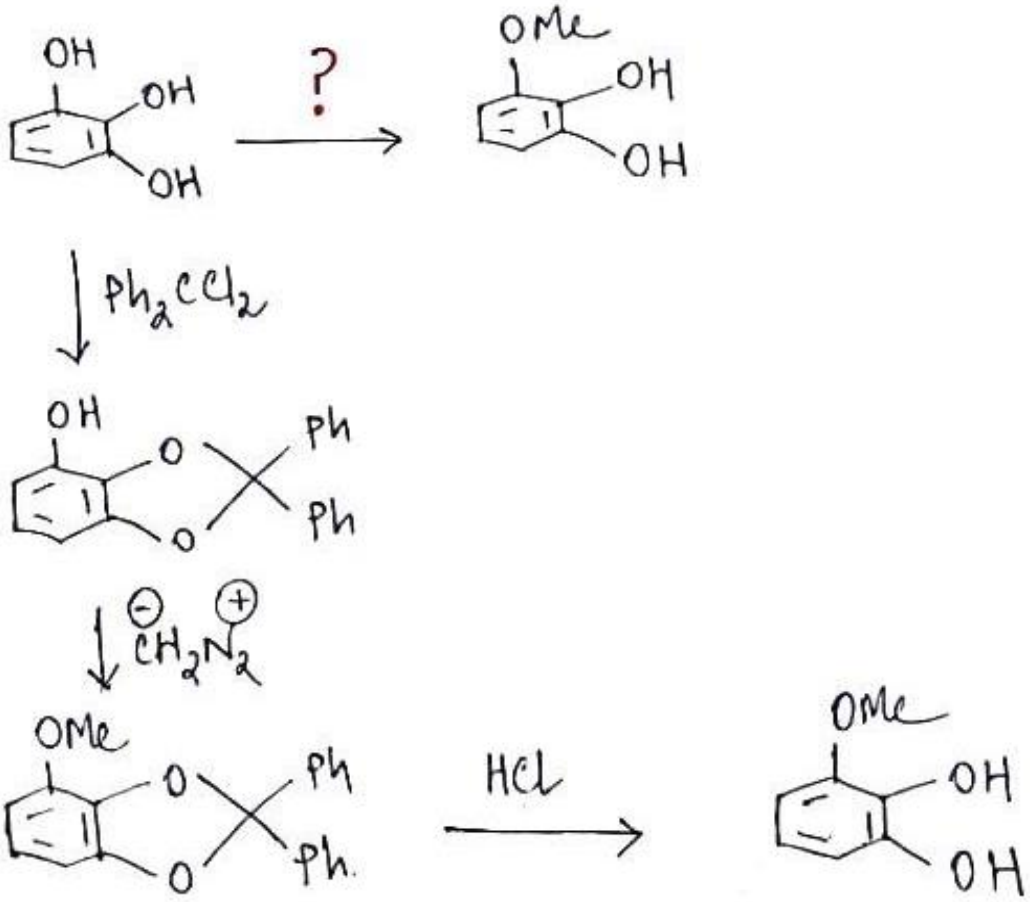
- 
Br
OH
D
OH
H+ / HCl
Br
O
Mg / ether
MgBr
O
D_2O
D
O
H_3O^+
D
OH


?
?
Me3SiCl
OSiMe3
Me-I
SiMe3
nBu4NF
TsOH
CH3-I
H3O+
via,

- 
OH
?
OH
COOH
CH3
PhSO2Cl
OSO2Ph
CH3
i) Alkaline KMnO4
ii) H3O+
OH
COOH

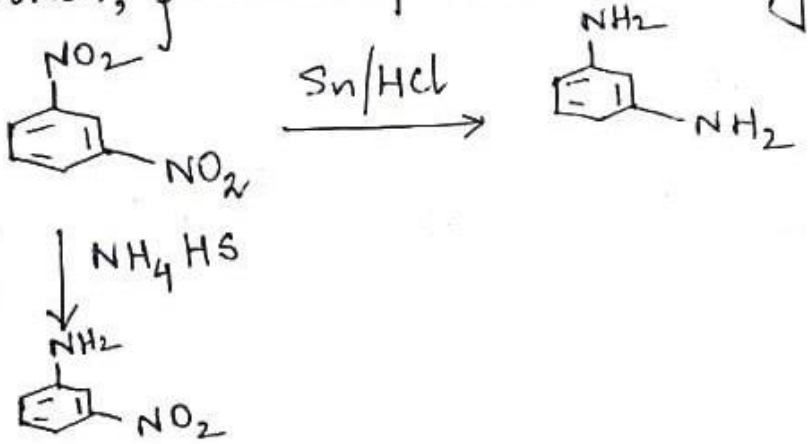
- 
OH
OH
OH
?
OH
OH
O
>=O/dry HCl
O
O
OH
CrO3/Py
O
O
O
H3O+
OH
OH
O

Sayanwita Panja/ B.Sc/ Chemistry (H)/ Sem-IV/ CC10/ The logic of Organic Synthesis

- 

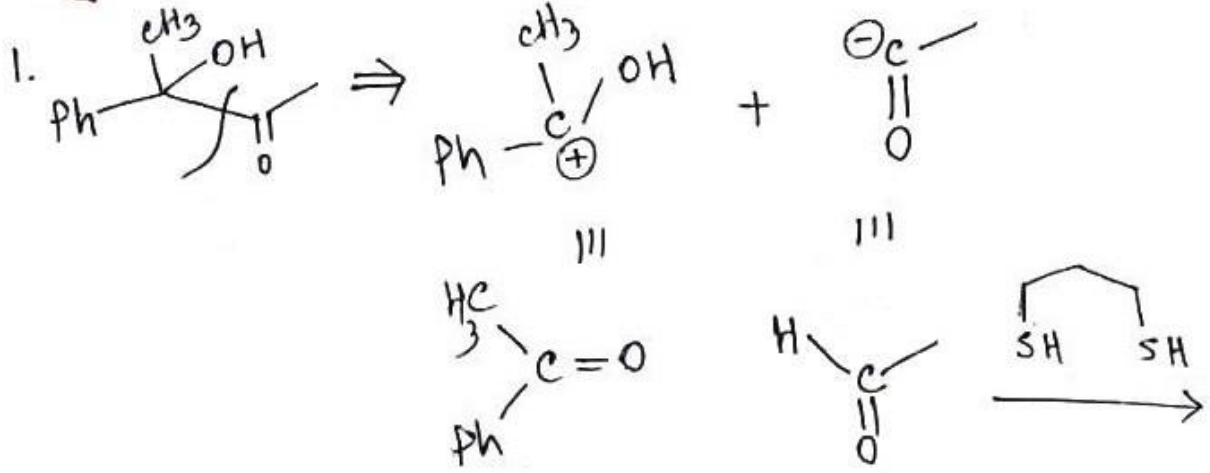
Chemoselectivity :-

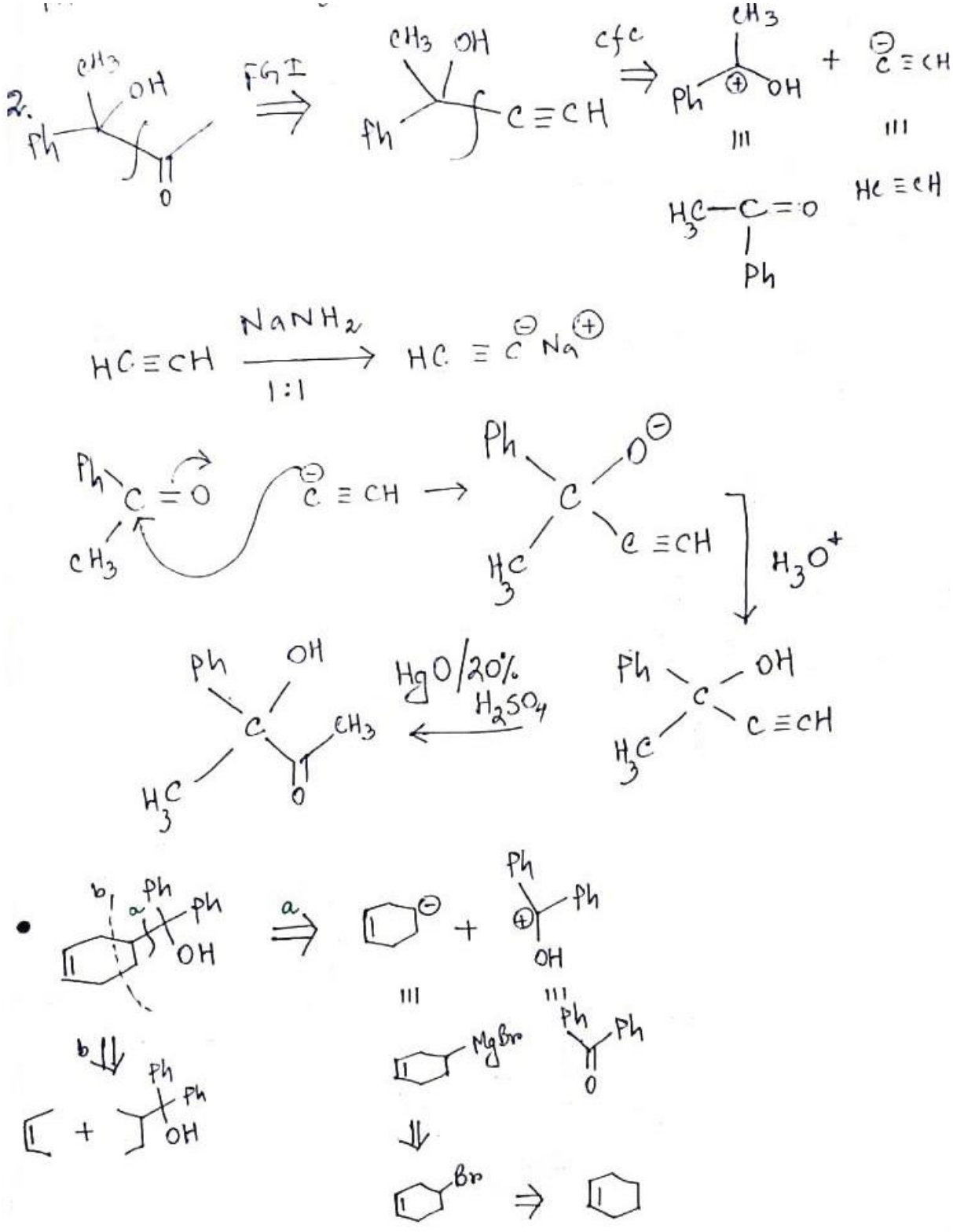
A rxn in which one functional gr. within a molecule reacts leaving other protectionally reactive functional gr(s) unaltered is called chemoselective rxn. When a molecule contains two or more reactive groups and we want to react one of them but not other, problem of chemoselectivity arises.

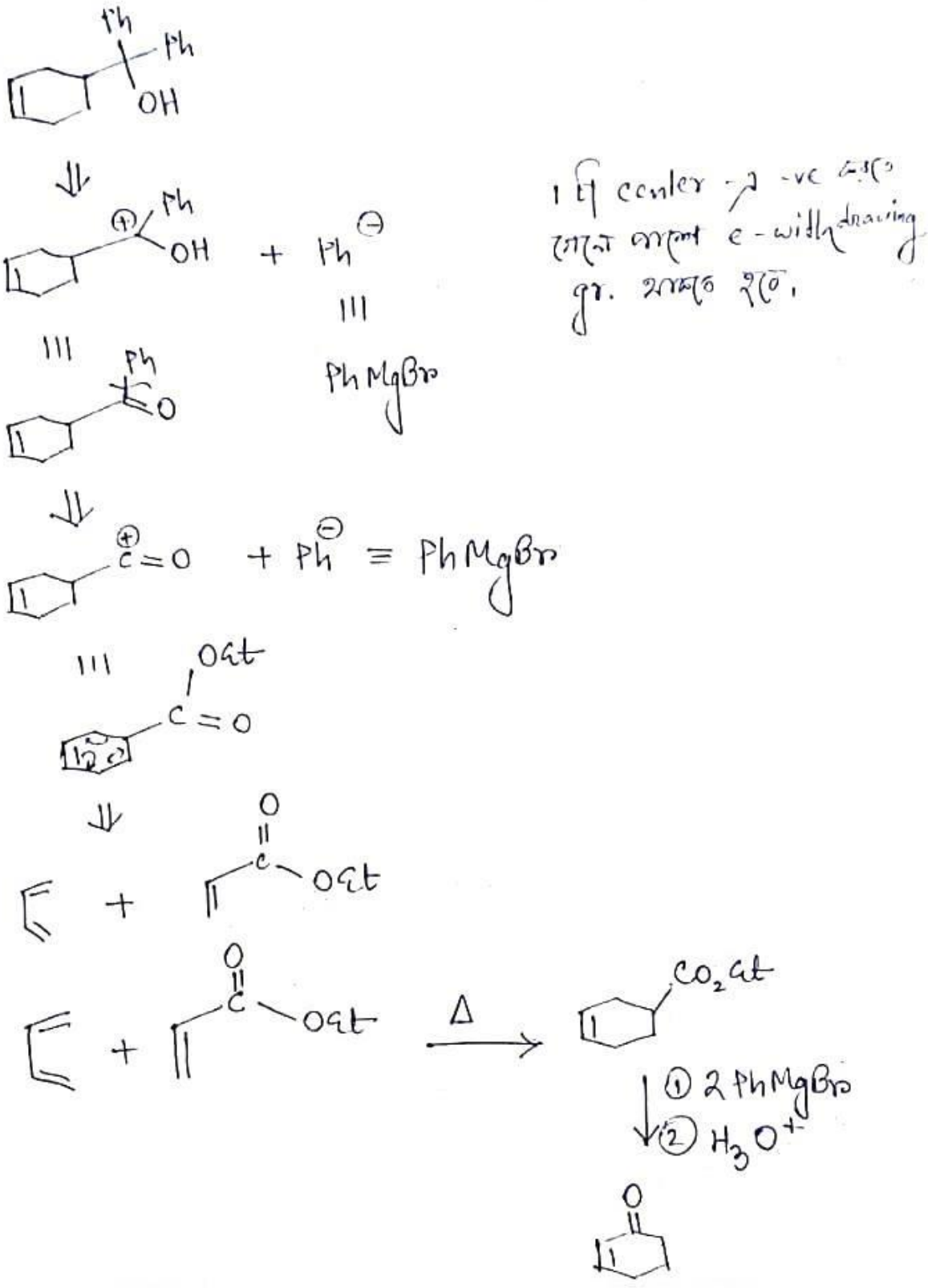


Synthesis :

1.




2.
FGI
cfc
NaNH2
1:1
HgO/20%
H2SO4
H3O+
3° alcohol,
R-Mg x



1 টি center -এ -ve charge যেকে কার্বন e- withdrawing gr. থাকতে হবে।