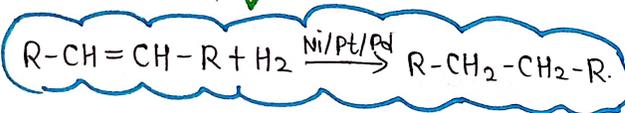
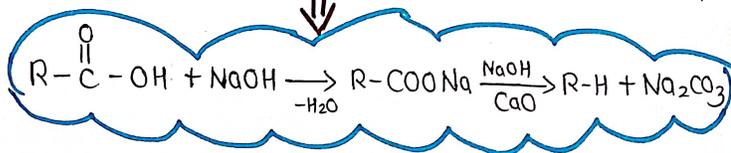


Catalytic Reduction of =/≡
Sabatier / Sabatiers Reaction.



Decarboxylation of sod. salt of carboxylic acid.



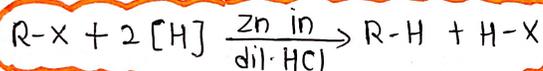
MOP OF
ALKANE

Kolbe electrolysis / Decarboxylation.



From Alkyl Halide (R-X)

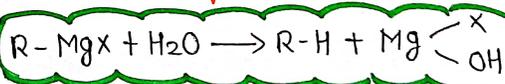
Ⓐ Reduction.



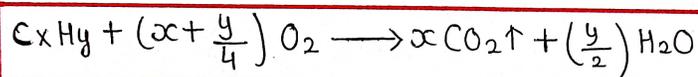
Ⓑ Wurtz synthesis



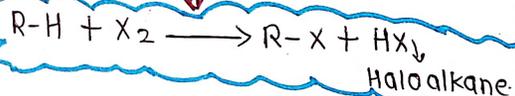
From Grignard Reagent



VT SIR ORGANIC NOTES



Free Radical Mechanism.



Higher Alkenes ← Dehydrogenation

(C-H) breaks

Pyrolysis:-

Higher alkanes

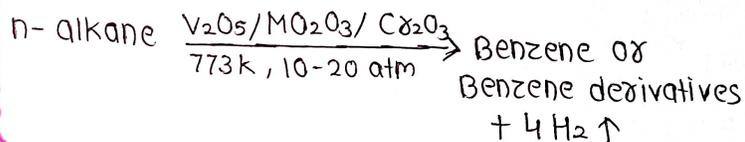
773 K

CHEMICAL PROPERTIES.

(C-C) breaks

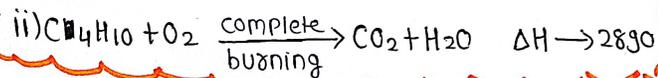
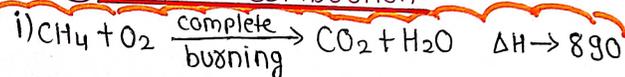
Lower Alkanes ← Cracking

Aromatization / Reforming / cyclisation.



Oxidation.

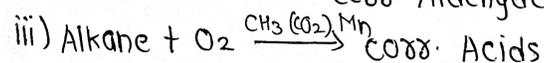
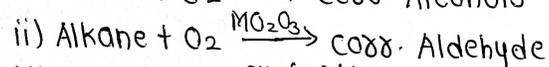
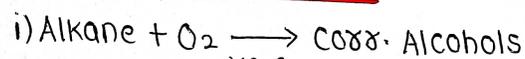
(a) Complete Combustion.



(b) Incomplete Combustion.



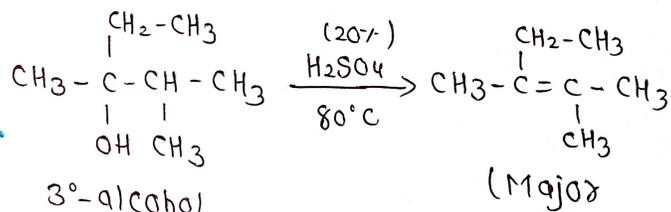
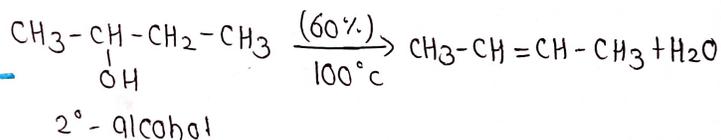
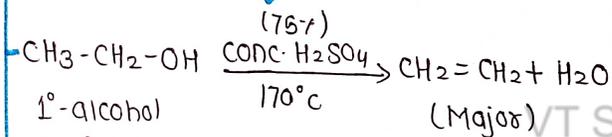
(c) Controlled Oxidation.



Dehalogenation of vicinal dihalides



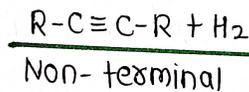
From Alcohols (Acidic Dehydration)



MOP OF Alkene.

From Non-terminal Alkynes (Partial Reduction)

Lindley's Reagent

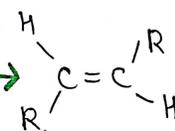
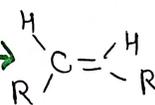


Syn addn

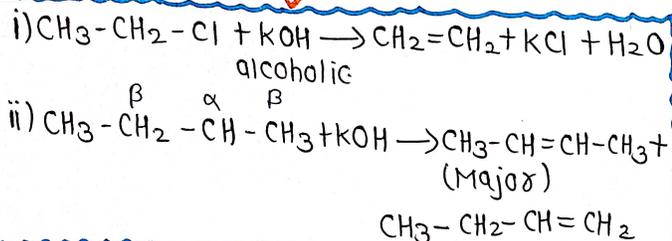
Anti addn

Na · liq NH₃

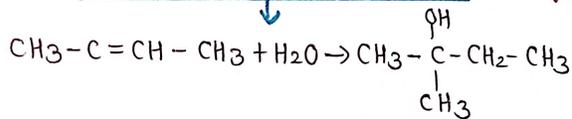
NaNH₂



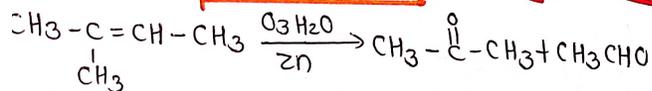
From alkyl Halide (Dehydrohalogenation)



Addition of H₂O (Hydration)

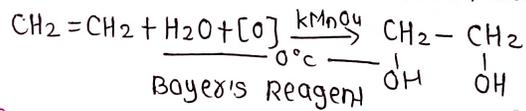


Ozonolysis

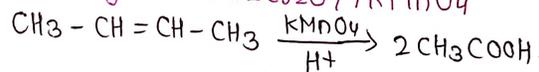


Oxidation

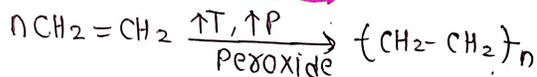
a) Using cold aq. alkaline KMnO₄ soln



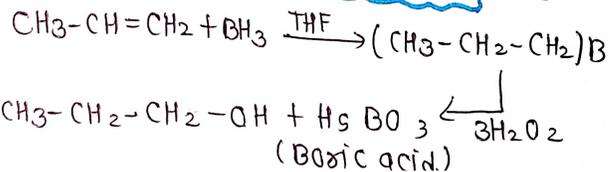
b) Using acidic K₂Cr₂O₇ / KMnO₄



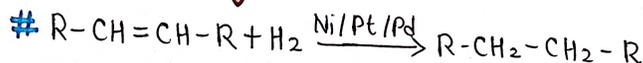
Polymerisation



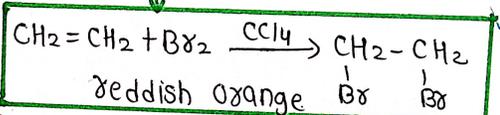
Hydrocarbonation - Oxidation



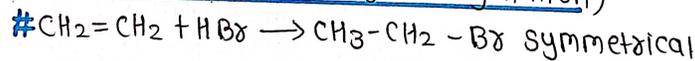
Addition of H₂ (Reduction)



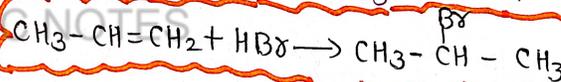
Addition of X₂



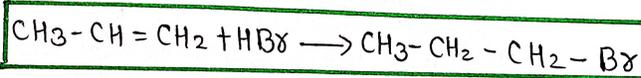
Addition of X-H (Hydrohalogenation)



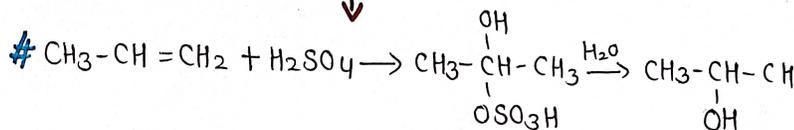
Markonikov Rule → Unsymmetrical



Anti-markonikov Rule / peroxide effect / Mayo effr / khazash effect



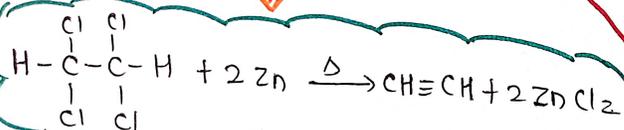
Addition of cold conc. H₂SO₄ followed by Hydration



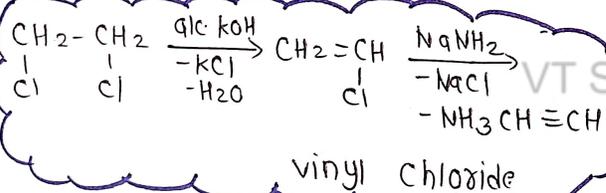
Chemical Properties Alkene

VT SIR ORGANIC NOTES

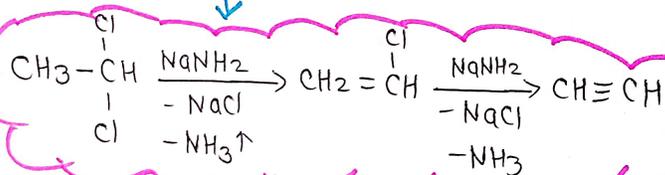
From vicinal tetrahalides:



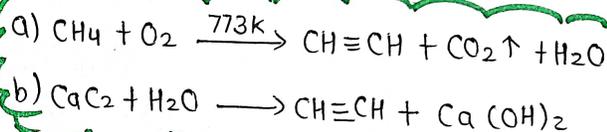
From vicinal dihalides
(Double dehydrohalogenation):



From Geminal Dihalides

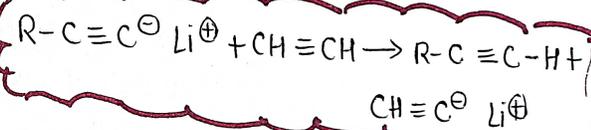


Industrial MOP OF Alkynes:

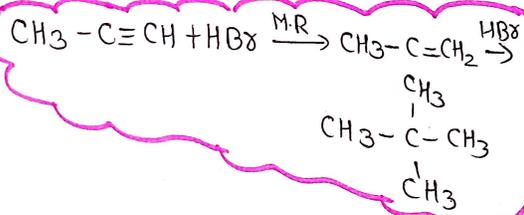


MOP OF Alkyne.

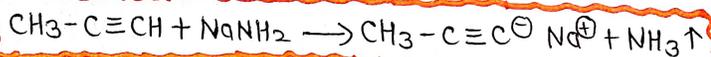
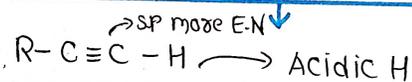
Reaction of terminal alkynes with lithium alkynide



Addition of H-X

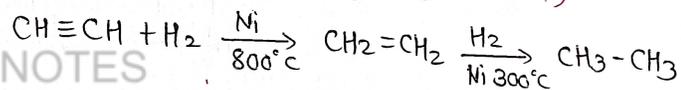


Acidic character of terminal Alkynes

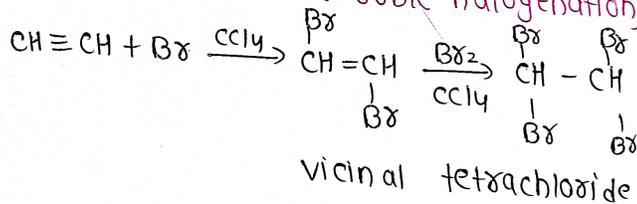


EA Reactions

① Addition of H₂ (Hydrogenation)

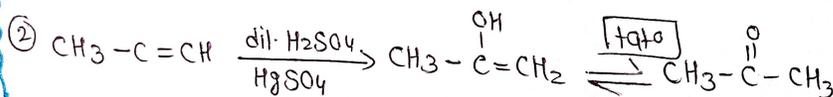
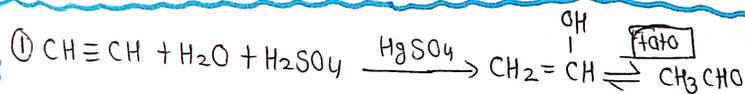


② Addition of X₂ (Double halogenation)



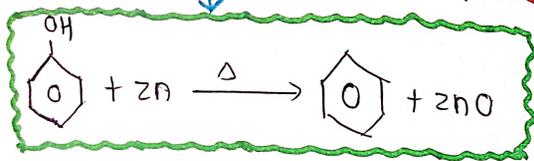
Chemical Properties

Addition of H₂O / Kucherov Reaction

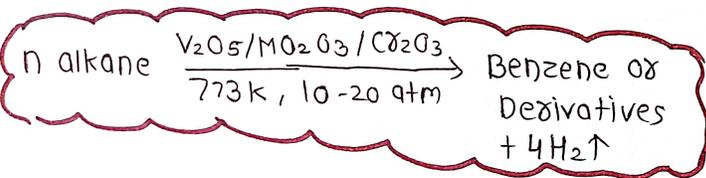


VT SIR ORGANIC NOTES

Reduction of Phenol



Aromatisation of Hexane



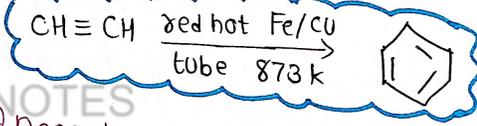
MOP of Benzene

Industrial Method

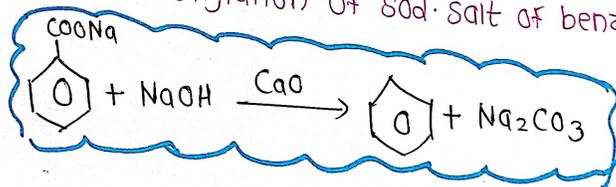
→ coal-tar and petroleum.

Other MOP

① From trimerism/polymerism of ethyne



② Decarboxylation of sod. salt of benzoic acid



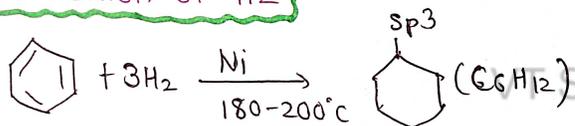
VT SIR ORGANIC NOTES

Complete / combustion oxidation
Sooty Flame test

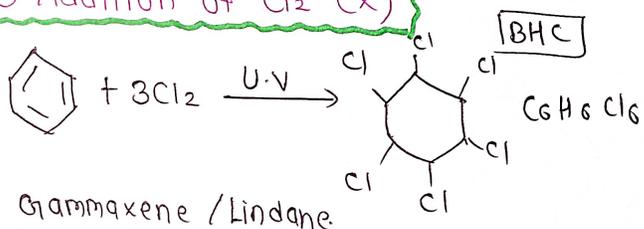


Addition Reaction (Free radical addition)

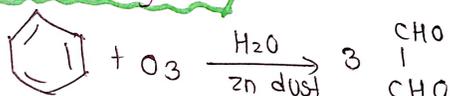
① Addition of H_2



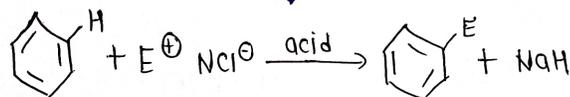
② Addition of Cl_2 (x)



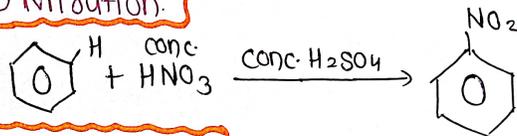
③ ozonolysis



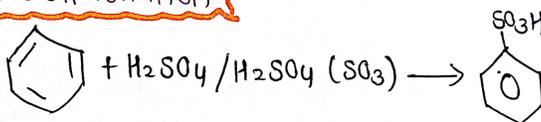
Electrophilic substitution (SE) Reactions



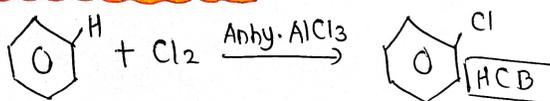
① Nitration



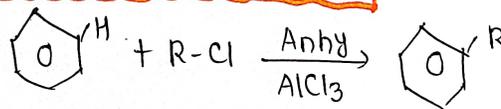
② Sulphonation



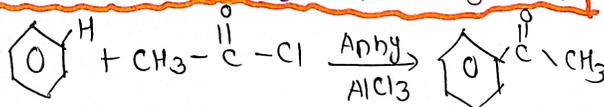
③ Halogenation



④ Friedel Craft Alkylation



⑤ Friedel Craft Acylation / Acetylation

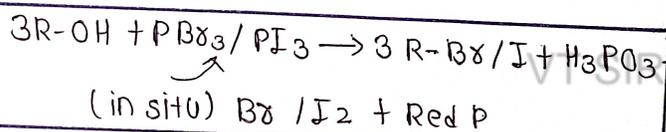
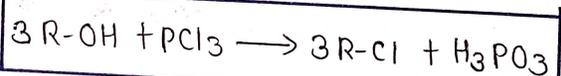


Chemical Properties Benzene

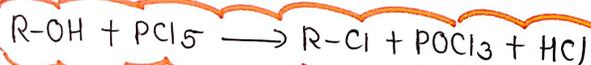
From Hydrocarbons

- ① Reflex Halogen of Alkane
- ② Reflex Addⁿ of H-X to alkane

Reaction with X₃



Reaction with PX₅



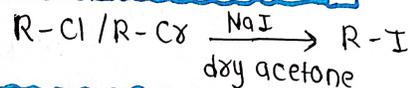
Reaction with SOCl₂



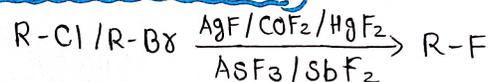
MOP of Haloalkane

Halogen Exchange

① Finkelstein Reaction

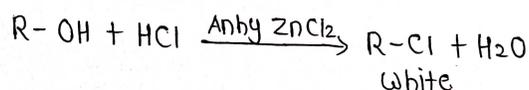


② Swarts Reaction



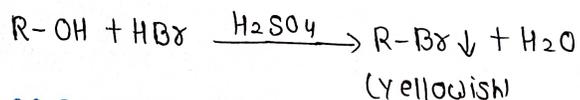
From Alcohols - Groove's Process

① with HCl

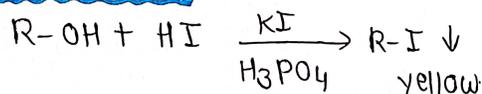


3° alco → immedi, 2° alco → 10 min, 1° alco → 80 min

② with HBr



③ with HI



Nucleophilic Substitution (S_N) Reactions



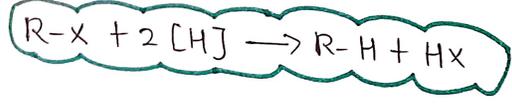
- ① $R-X + KOH(aq) \rightarrow R-OH$ (Alcohol)
- ② $R-X + R'-\overset{O}{\parallel}C-OAg \rightarrow R-\overset{O}{\parallel}C-O-R$
alkyl halide alkanoate ester
- ③ $R-X + NH_3 \rightarrow R-NH_2$ (1° amine)
(alc) ex
- ④ $R-X + R'-ONa \rightarrow R-O-R$ (Williamson's)
ether ether synthesis
- ⑤ $R-X + KCN \rightarrow R-CN$ (nitriles)
- ⑥ $R-X + AgCN \rightarrow R-NC$ (isocyanides)
- ⑦ $R-X + KNO_2 \rightarrow R-O-N=O$ (alkyl nitrite)
Potassium nitrite
- ⑧ $R-X + AgNO_2 \rightarrow R-NO_2$ (nitro alkane)
Silver nitrite

Chemical
Properties
Haloalkane

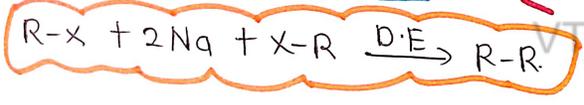
Elimination



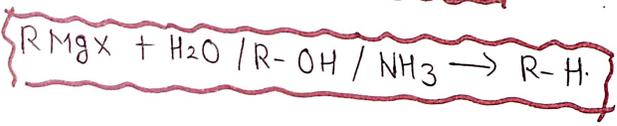
Reduction



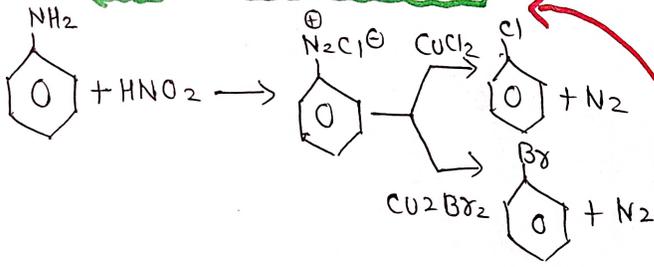
Reaction with metals



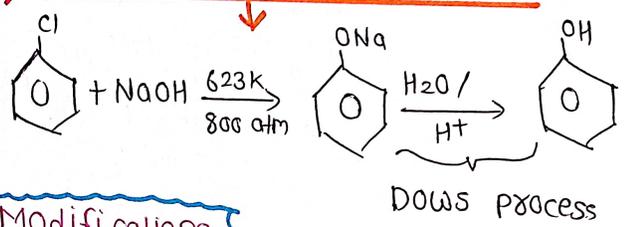
Reaction with Mg Metals



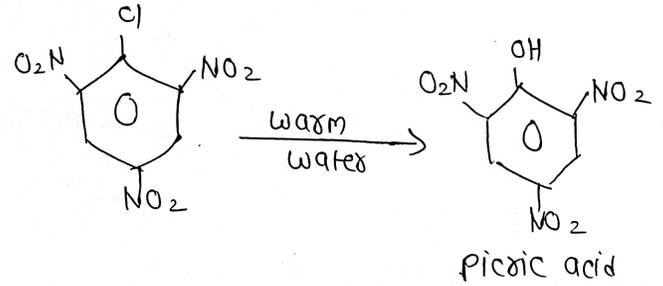
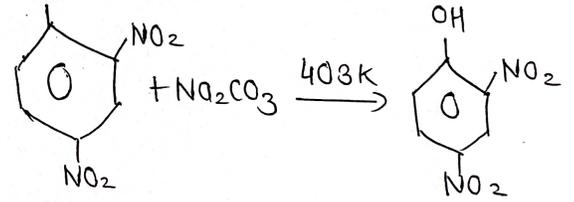
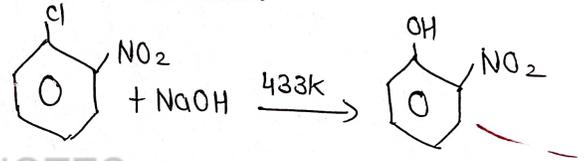
Sandmeyer Reaction:



Replacement of 'X' by (OH)

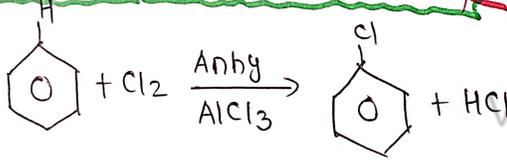


Modifications:

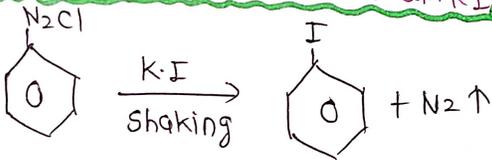


MOP OF HALOGENES

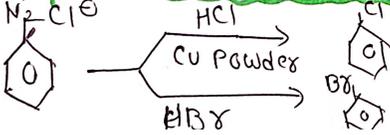
SE Reaction (chlorination of Benzene)



Reaction of Diazonium salt with KI



Gattermann Reaction



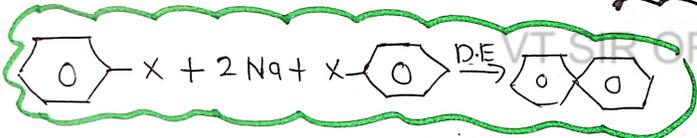
Reaction with Metals

Reaction with 'Na'

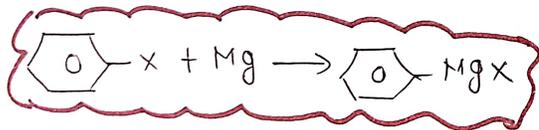
(a) Wurtz-Fittig Reaction



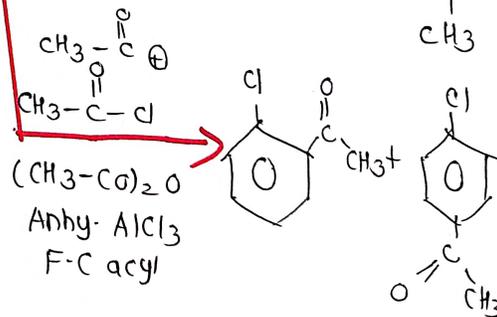
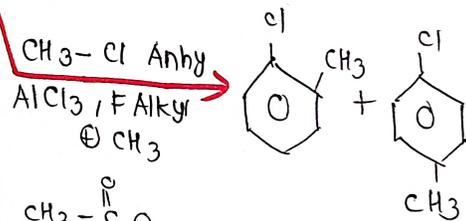
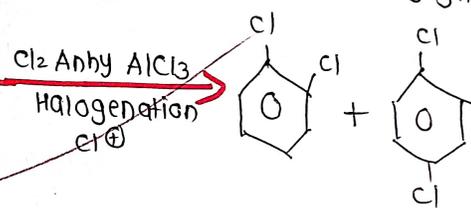
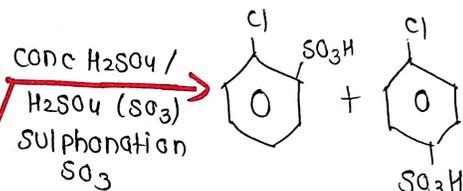
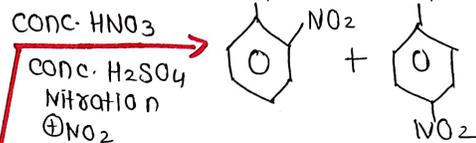
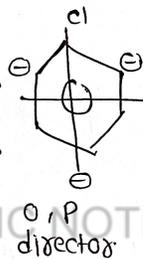
(b) Fittig Reaction



Reaction with Mg



Chemical properties
Haloarenes



Actⁿ of aq. KOH on R-X
 Refer SN reactions of R-X.

Hydration of Alkenes

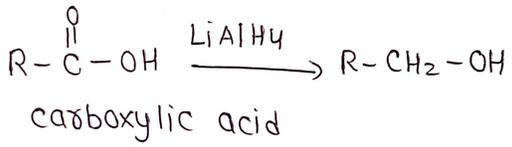
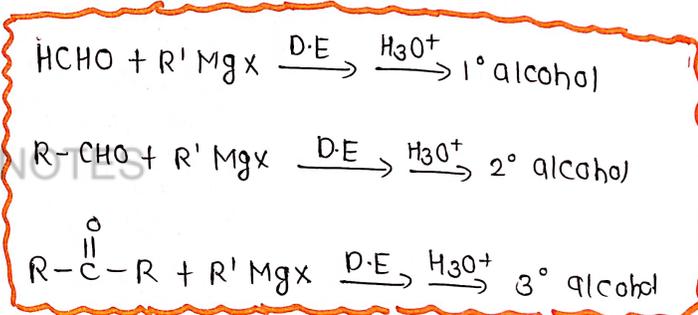
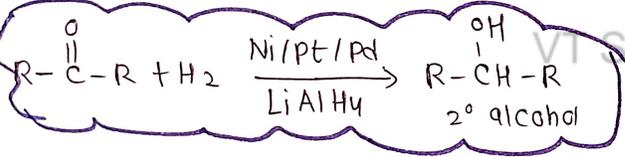
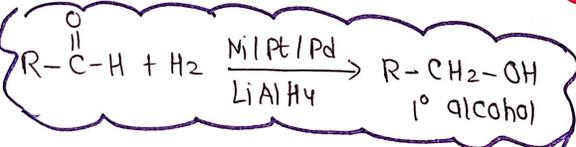
Hydroboration oxidation of alkenes

Actⁿ of RMgX on ald / ketones

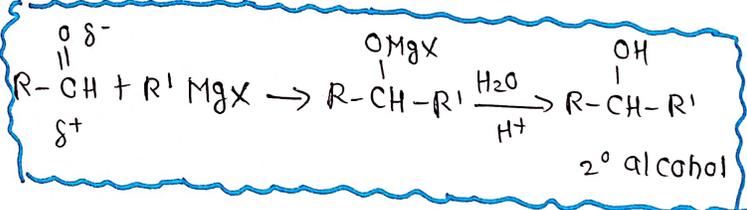
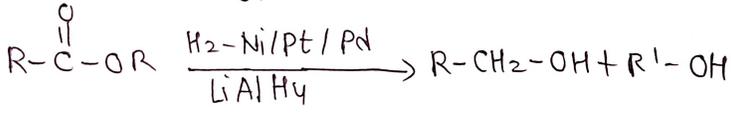
} Refer MOP of Alkenes

Reduction of carbonyl compounds

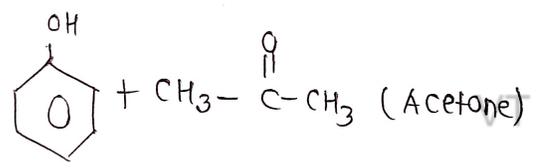
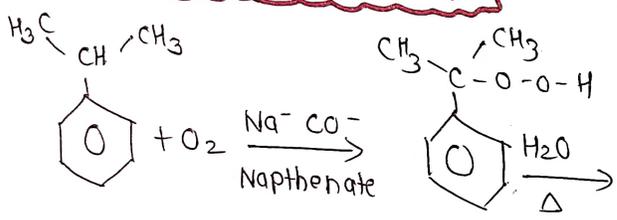
MOP of ALCOHOLS



⇌ esterification
 R'-OH



From Cumene (Industrial method)

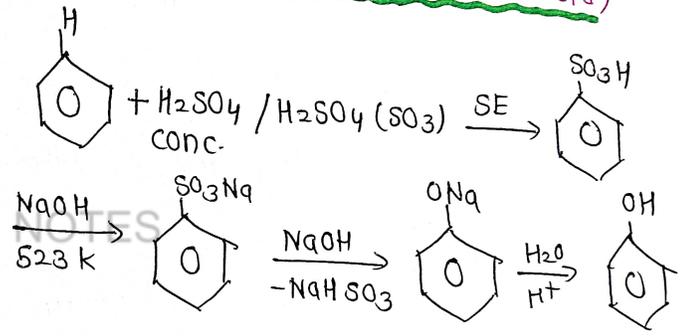


MOP of Phenols

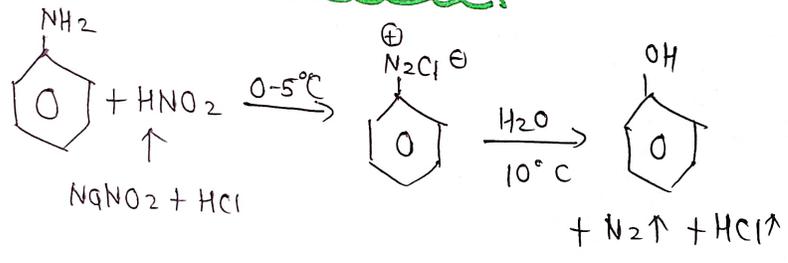
From chlorobenzene (Dow's process)

↳ Refer chem. prop. of Halobenzene.

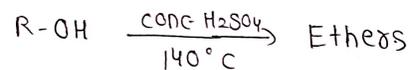
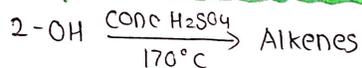
From Benzene (sulphonic acid)



From Benzene Diazonium Salt

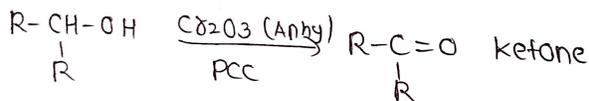
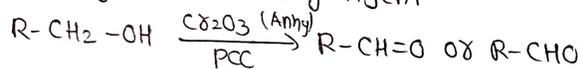


Acidic Dehydration



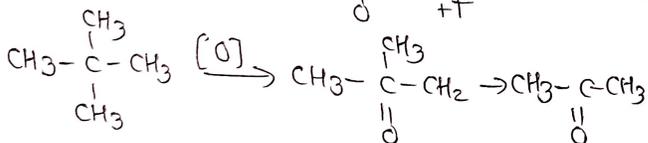
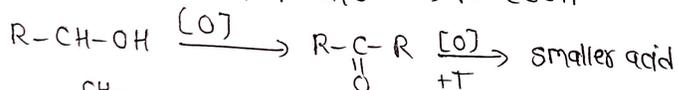
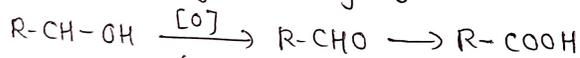
Oxidation

① Using mild oxidising Agent

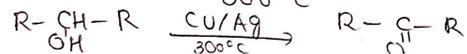
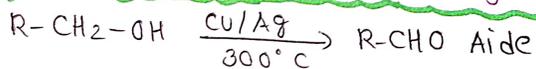


3° alcohol \Rightarrow No effect

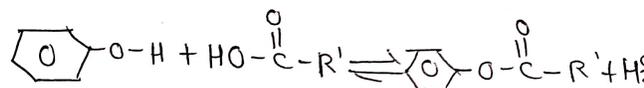
② Using strong oxidising Agent



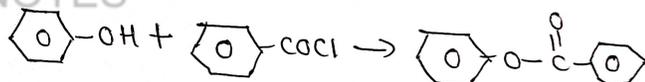
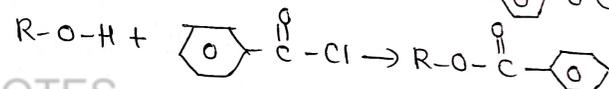
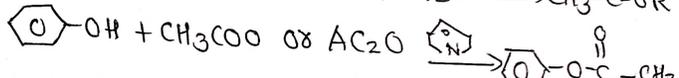
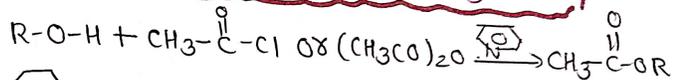
Oxidation with Cu/Ag (catalytic dehydrogenation)



Esterification



Acetylation and Benzoylation



Reaction involving breakdown of C-O bond

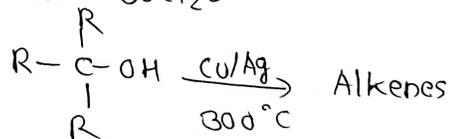
① With H-X

② With PX_3

③ With PX_5

④ With SOCl_2

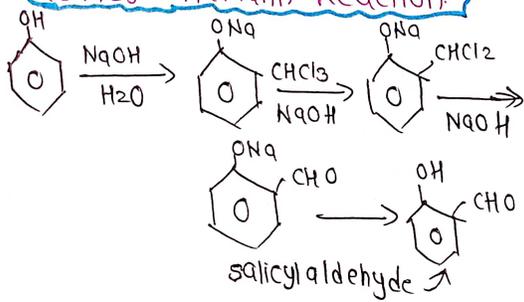
} Refer MOP of Haloalkane



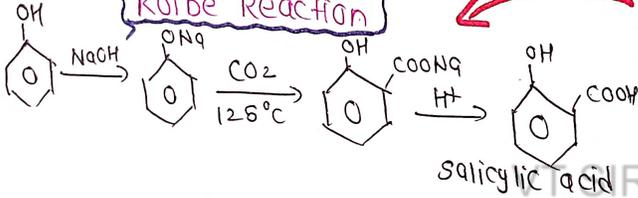
Chemical Properties of Alcohols & Phenols

VT SIR ORGANIC NOTES

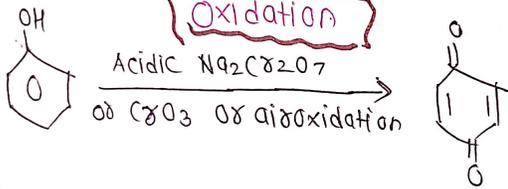
Reimer-Tiemann Reaction



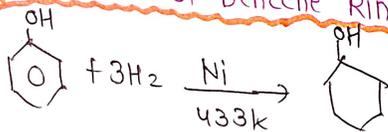
Kolbe Reaction



Oxidation



Reduction of benzene Ring

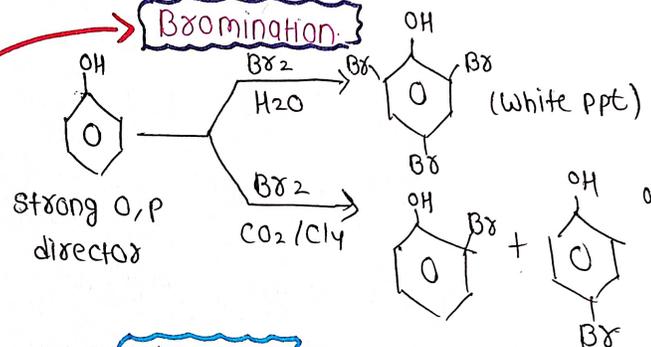


Reduction of OH

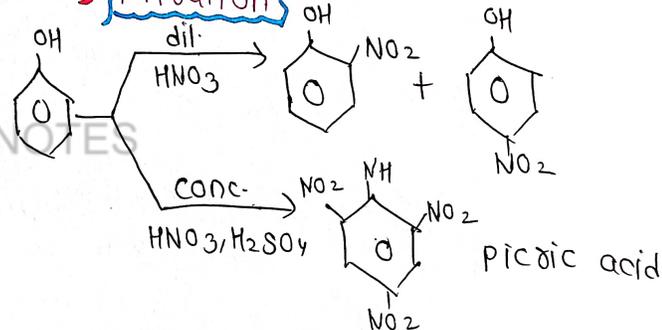


3E Reactions of Phenols

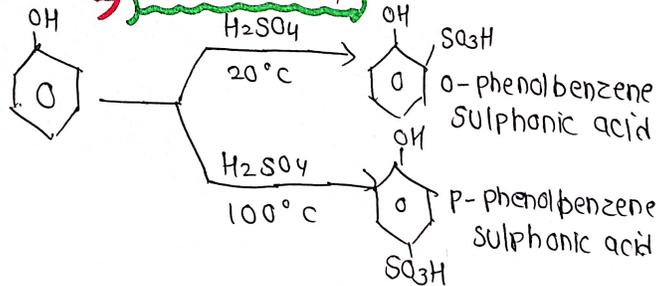
Bromination



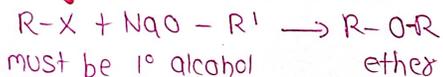
Nitration



Sulphonation



Williamson's ether synthesis

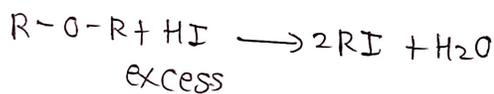
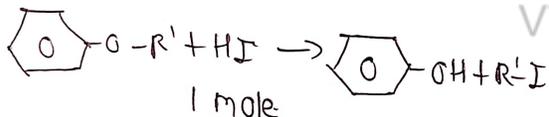
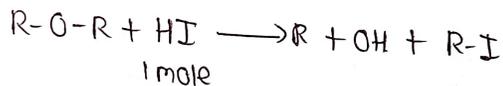


MOP of Ethers

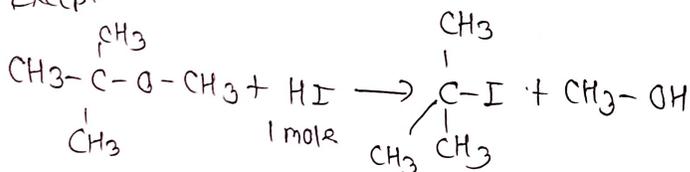
Acidic Dehydration of Alcohol

Refer chem. prop. of alcohols

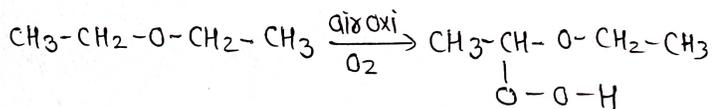
© With H-X



Except

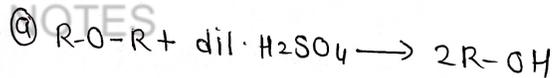


Reaction involving 'c' chain

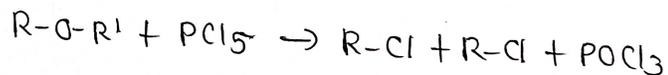


Chemical Properties Ethers

Reaction involving breakdown C-O



② With PCl_5



Aldehyde, ketone & Carboxylic acid

Catalytic Reduction of Alcohols.

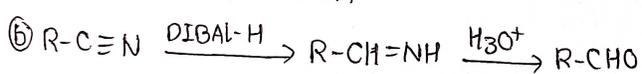
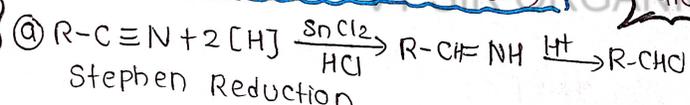
→ Refer chem. prop. of Alcohols.

Oxidising of alcohols using mild oxidising agents

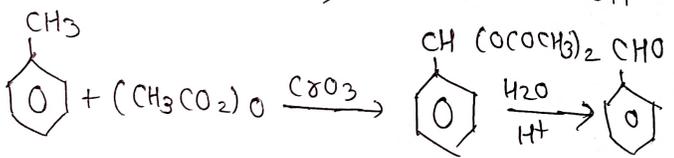
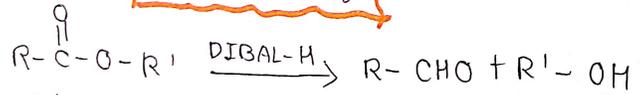
Rosenmund Reduction of acid halide



From Cyanides / nitrile (oxidn)



From Ester



MOP of Both Aldehyde & ketone

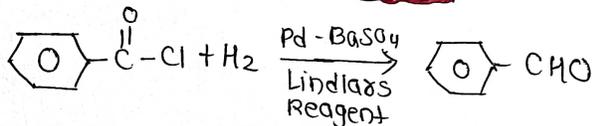
Ozonolysis of alkenes

→ Refer chem. prop. of alkenes.

Hydration of alkynes

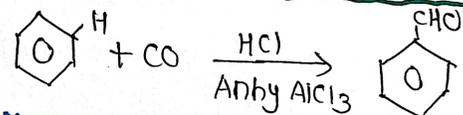
→ Refer chem. prop. of Alkynes

Rosemund Reaction.

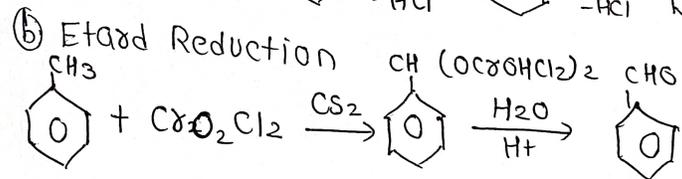
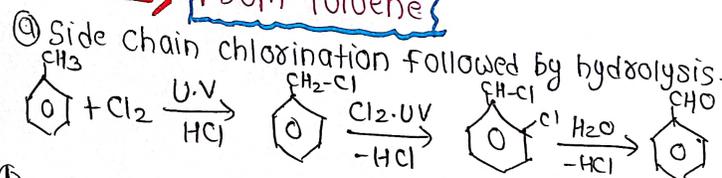


MOP of Aromatic ald.

Gattermann-Koch Synthesis.

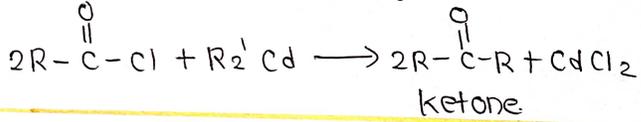
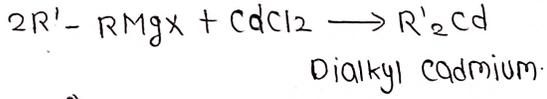


From Toluene



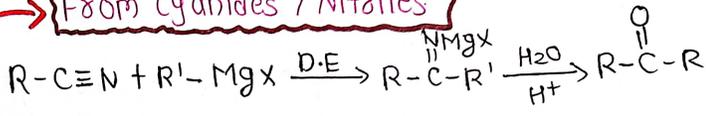
③ Reaction with CrO_3 and ac. anhydride.

From Acid chloride (using RMgX , CaCl_2)



MOP OF ketones

From cyanides / Nitriles



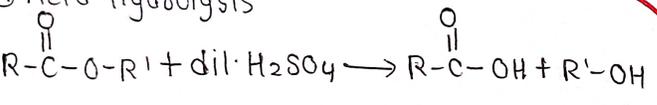
MOP of Aromatic ketones

F.C Acylation

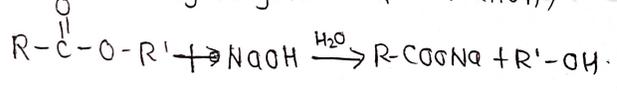
- Refer chem. prop. of Benzene

Hydrolysis of Ester

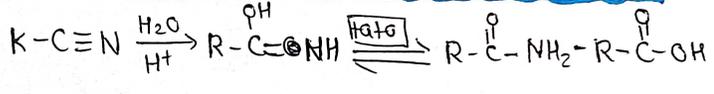
(a) Acid Hydrolysis



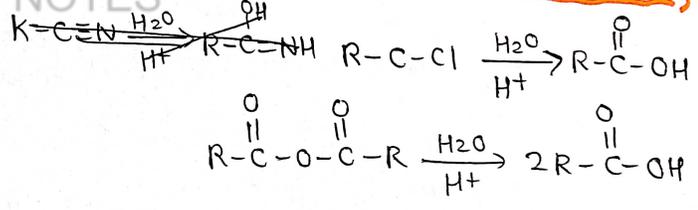
(b) Alkaline Hydrolysis (saponification)



Hydrolysis of cyanides and amides

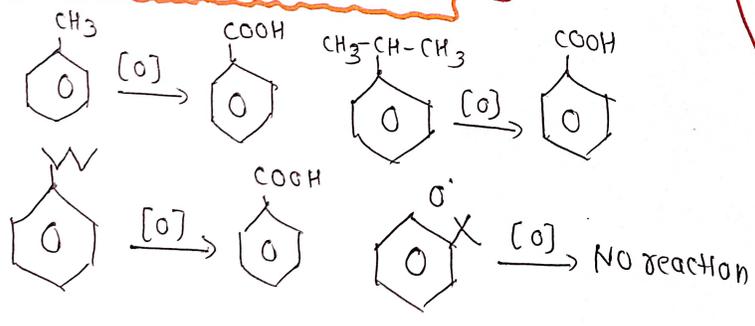


Hydrolysis of Acid halides & anhydrides

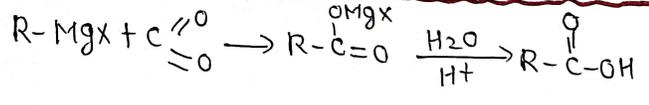


MOP of carboxylic acids

Oxidation of Alkyl Benzene



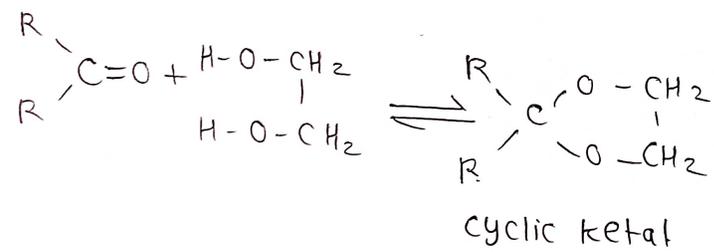
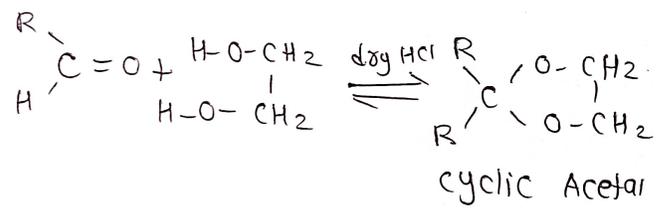
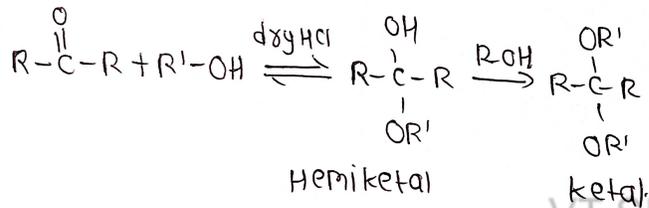
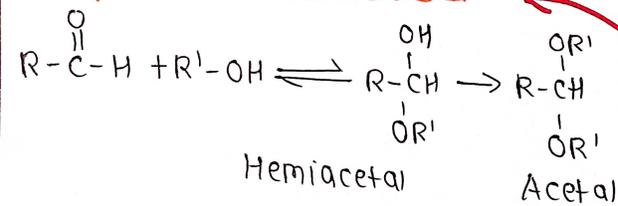
Reaction of RMgX on dry ice (solid CO_2)



Oxidation of alkenes using acidic KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$

Refer chem. prop. of Alkenes

Addition of Alcohols



Chemical Properties
Ald & keto

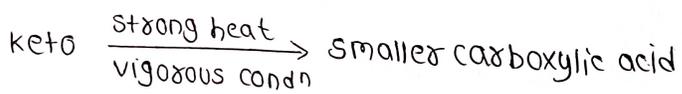
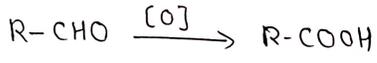
Addition of Derivatives (EN) Reaction

- ① $>C=O + H_2NH \rightarrow >C=NH$
- ② $>C=O + H_2N-OH \rightarrow >C=N-OH$ Oxime
- ③ $>C=O + H_2N-OH \rightarrow >C=N-OH$ Oxime
- ④ $>C=O + H_2N-NH_2 \rightarrow >C=N-NH_2$ Hydrazone
- ⑤ $>C=O + H_2N-NH-\text{C}_6\text{H}_5 \rightarrow >C=N-NH-\text{C}_6\text{H}_5$
- ⑥ $>C=O + H_2N-NH-\text{C}_6\text{H}_3(\text{NO}_2)_2 \rightarrow >C=N-NH-\text{C}_6\text{H}_3(\text{NO}_2)_2$
- ⑦ $>C=O + H_2N-NH-\overset{\overset{O}{\parallel}}{C}-NH_2 \rightarrow >C=N-NH-\overset{\overset{O}{\parallel}}{C}-NH_2$

Addition of RMgX

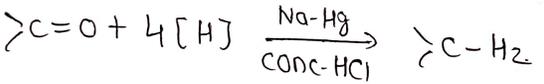
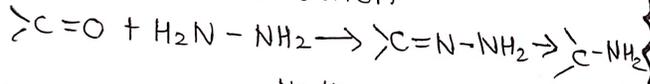
→ Refer MOP of Alcohols.

Using strong Oxidising Agents

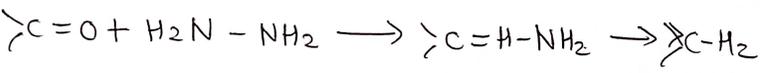


Reduction

① Chemmenson Reduction



② Wolf - kishner Reduction

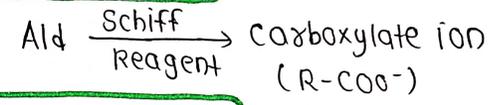


Chemical Properties
Ald & keto

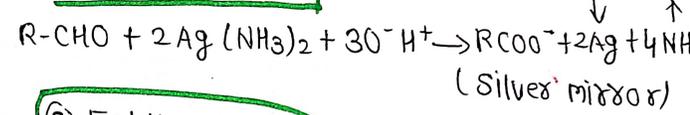
Oxidation

① Using Mild Oxidizing agents

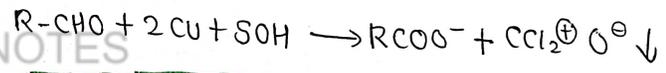
① Schiff test



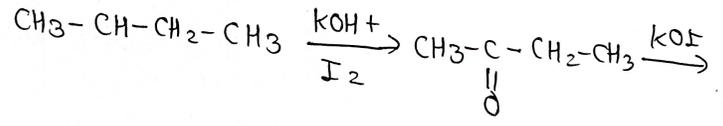
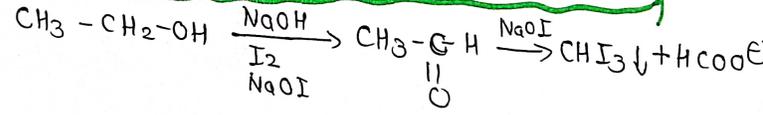
② Tollen's Test



③ Fehling Test

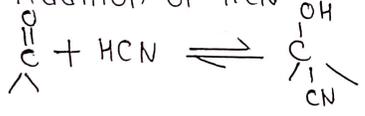


④ Haloform Test (Iodoform test)

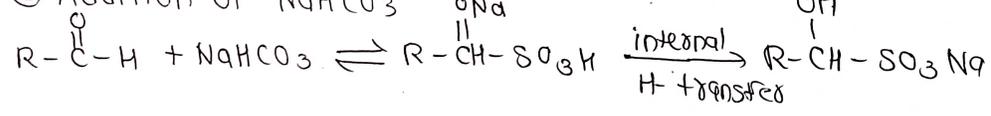


Nucleophilic addition (NA) reaction

① Addition of HCN

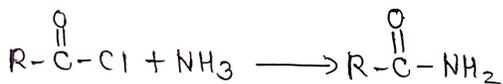
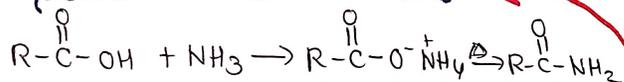


② Addition of NaHCO₃

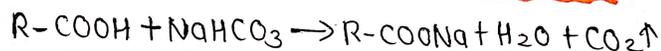


VT SIR ORGANIC NOTES

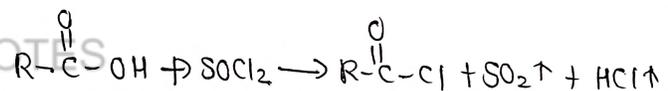
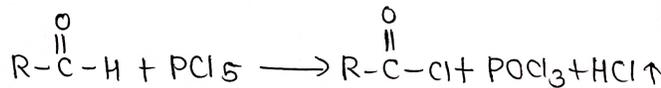
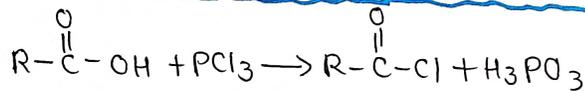
Reaction with Ammonia:



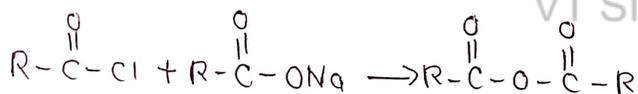
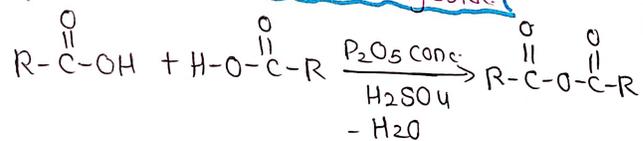
Reaction with mild base (NaHCO₃) test



Reaction with PCl₃, PCl₅ and SOCl₂



Formation of Acid Anhydride



Chemical Properties of carboxylic acid

VT SIR ORGANIC NOTES

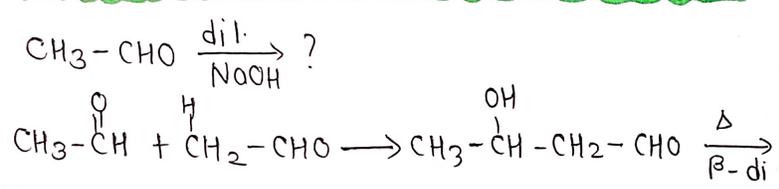
Decarboxylation of sod salt of carboxylic acid using sod. lime

→ Refer MOP of Alkane

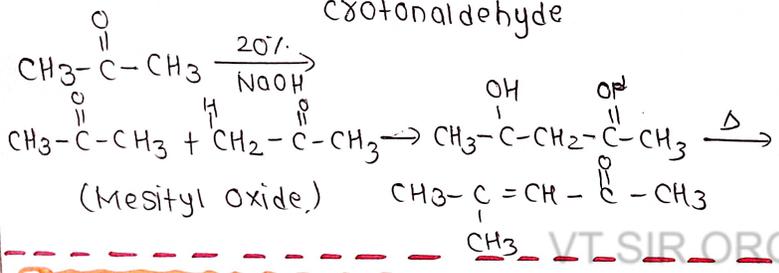
Reduction Using LiAlH₄/B₂H₆

- Refer MOP of Alcohols

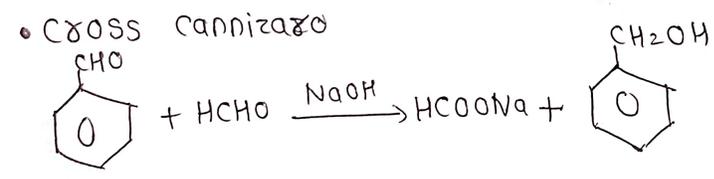
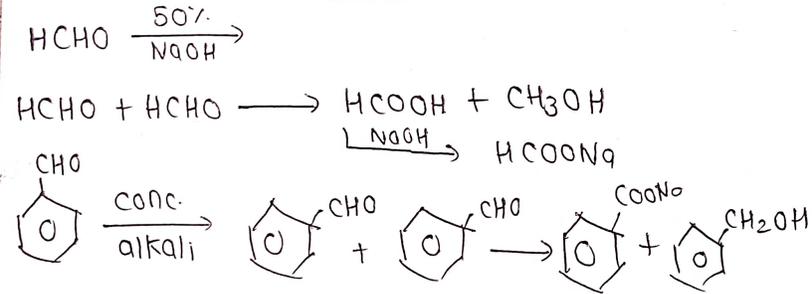
*** Aldol condensation (Addⁿ - elimi- α reaction)**



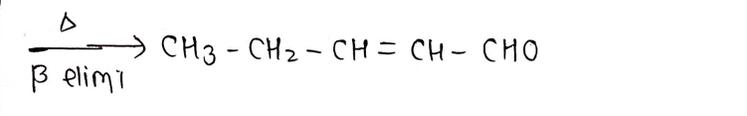
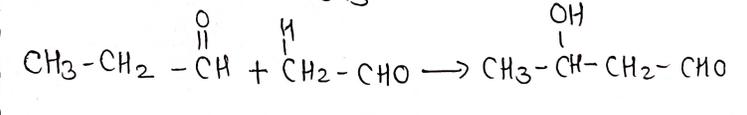
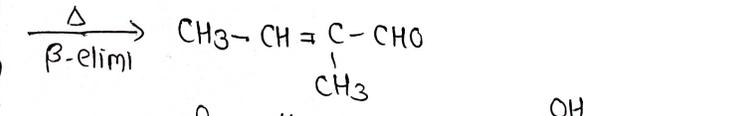
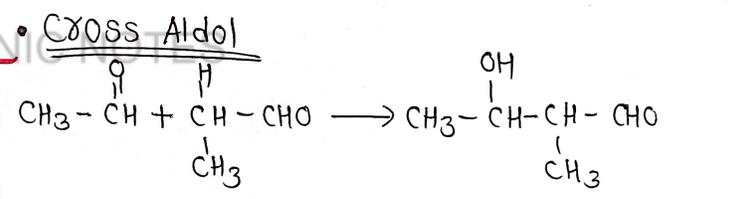
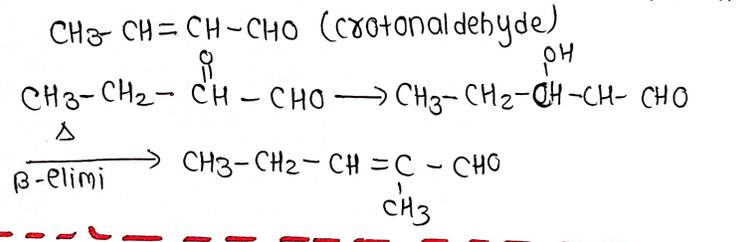
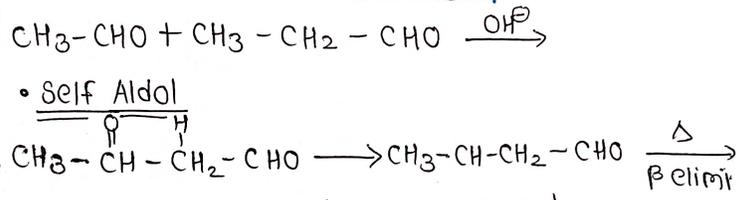
$\text{CH}_3\text{-CH}\equiv\text{CH-CHO}$
crotonaldehyde



*** Cannizzaro Reaction**

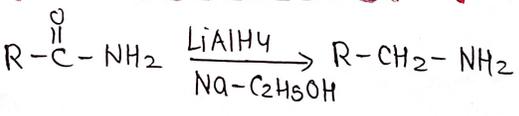


*** CROSS Aldol Condensation**

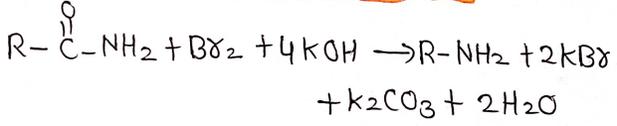


Amines

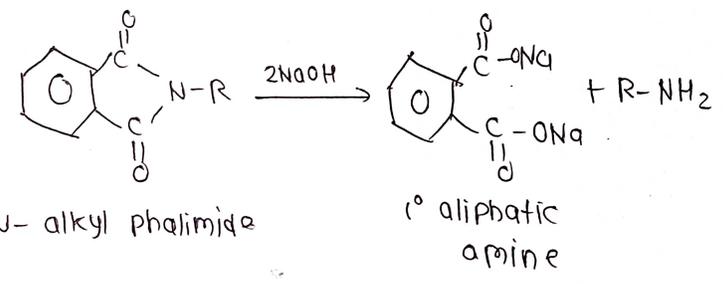
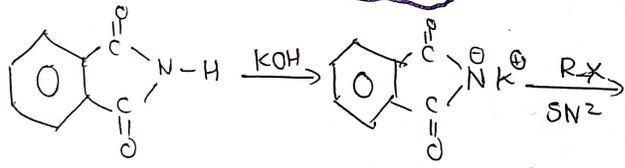
*** Reduction of Amides**



Hoffmann bromamide degradation

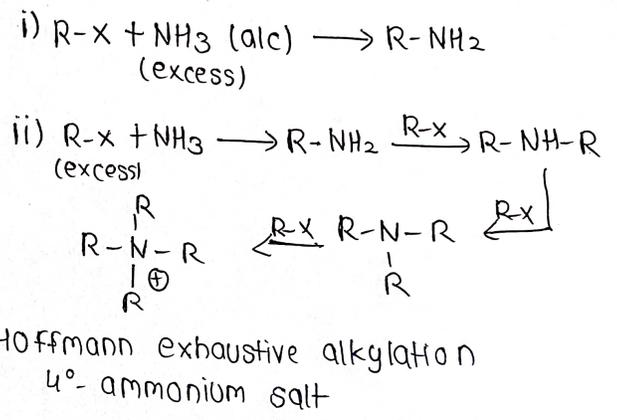


Gabriel - Phthalimide Synthesis

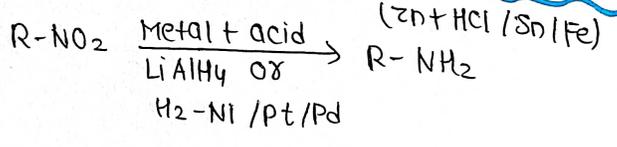


MOP OF Amines

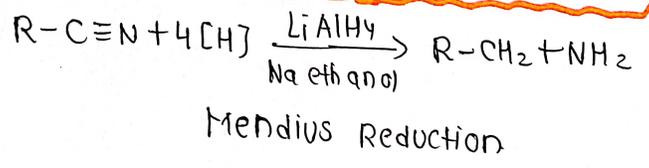
*** Alkylation**



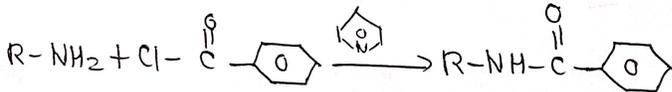
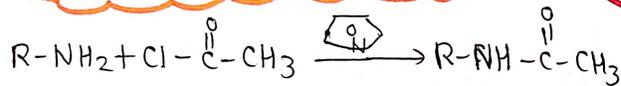
*** Reduction of Nitro compound**



*** Reduction of Nitrile / Cyanides**

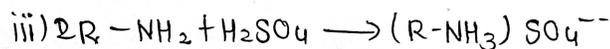
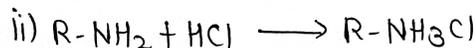
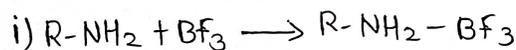


Acetylation and Benzoylation



Basic character

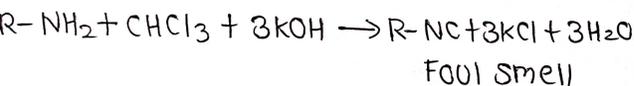
Amines can form salt with any Acid



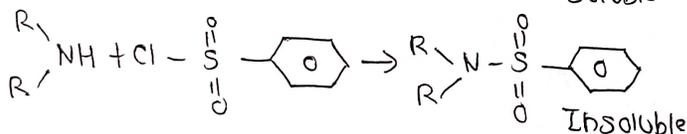
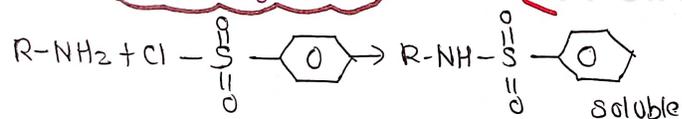
Chemical Properties Amines

Hoffmann exhaustive alkylation followed by Hoffmann elimination

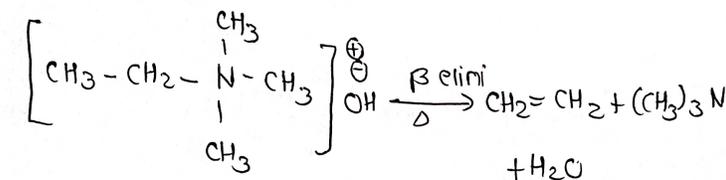
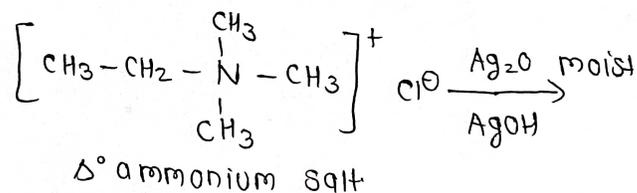
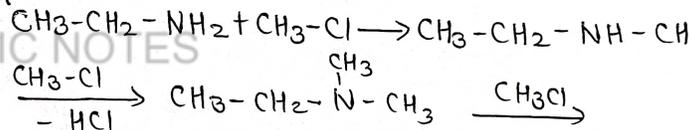
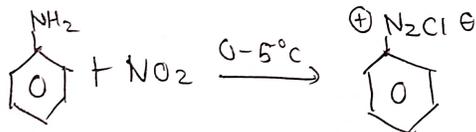
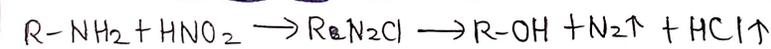
Casbyl amine test / isocyanide test



Hinsberg Test



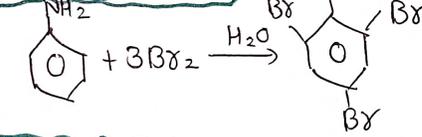
Reaction with Nitrous Acid



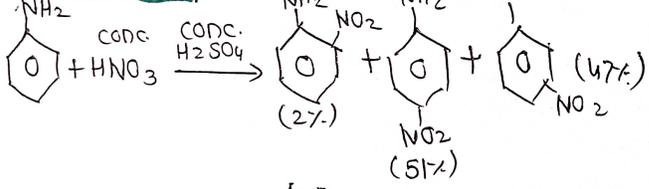
SE Reaction of Aniline

Reaction of Diazonium Salt

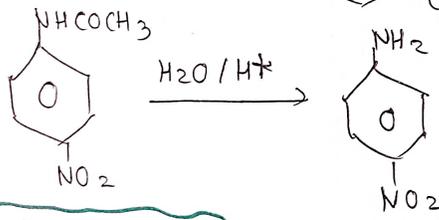
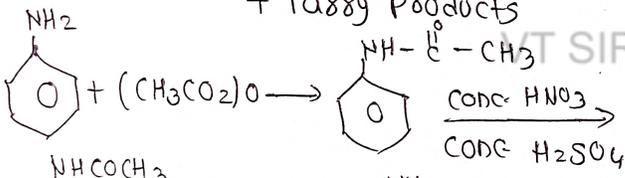
(A) Halogenation



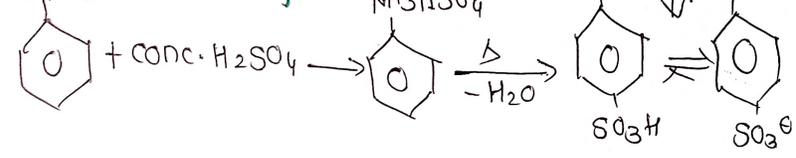
(B) Nitration



+ Tarry products



(C) Sulphonation



Chemical Properties Amines

