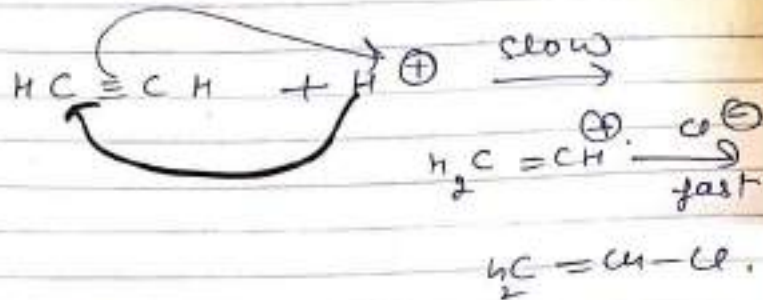
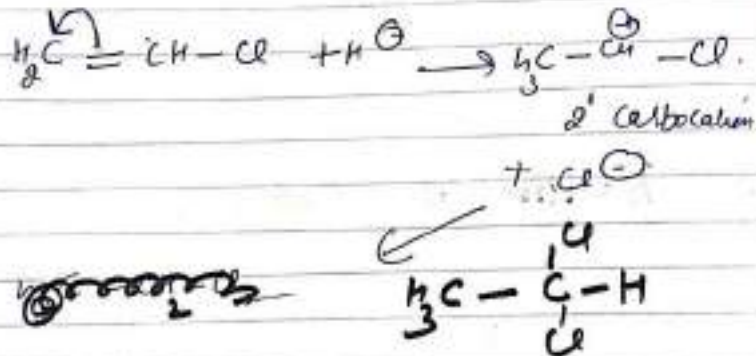


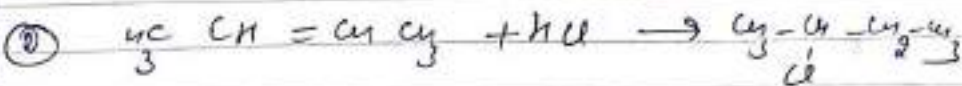
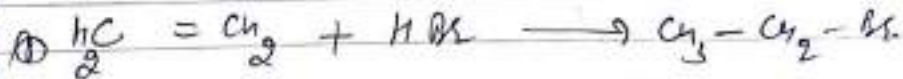
Step 1



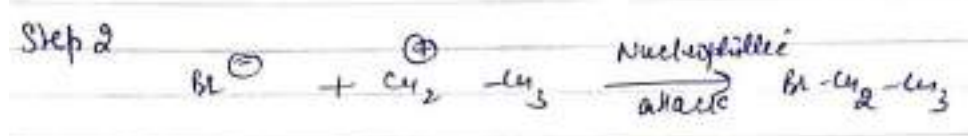
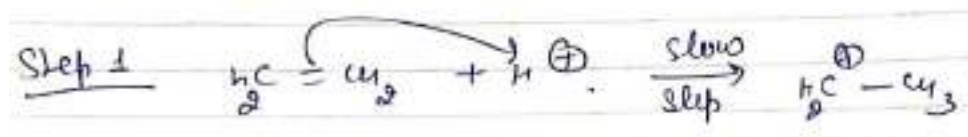
Step 2



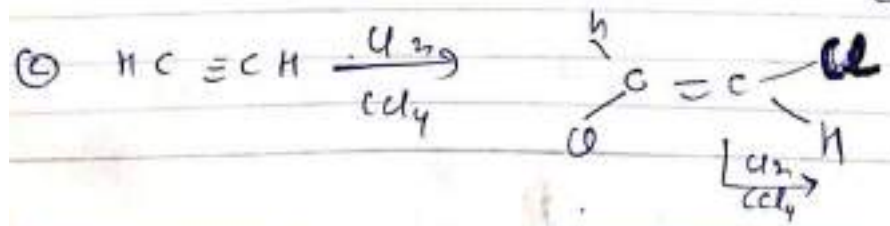
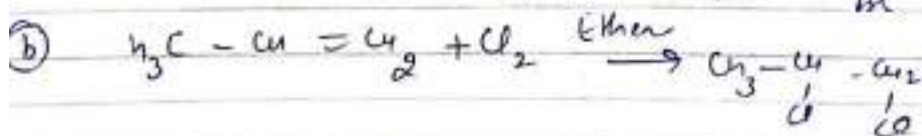
⑤ Addition to Symmetrical Alkenes

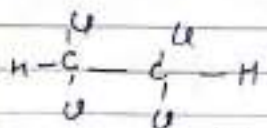


Mechanism



(v) Addition of halogens

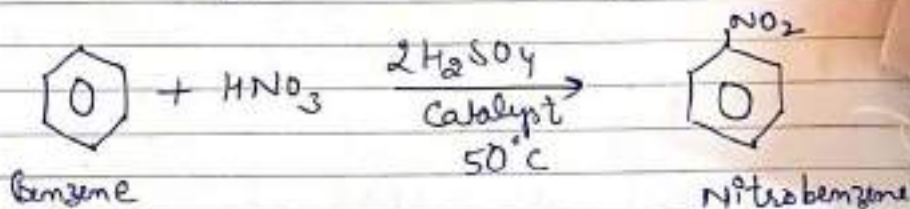




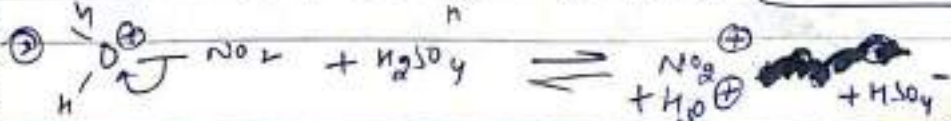
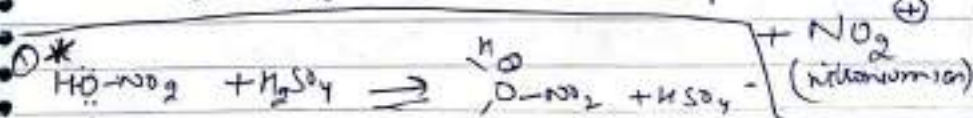
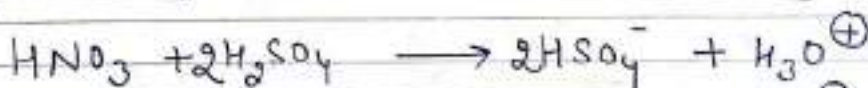
1,1,2,2 - Tetrachloroethane

Rest part of Electrophilic Substitution

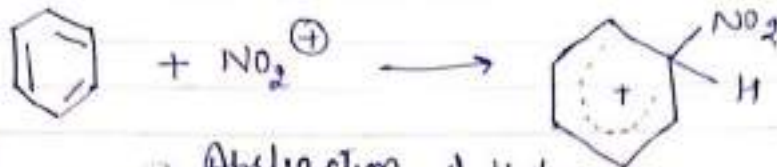
Mechanism of Nitration of Benzene



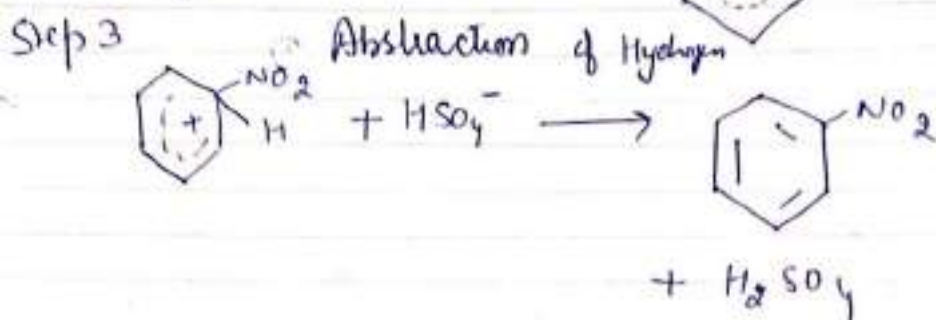
First Step - Generation of Electrophile



Step-2 Attack of Electrophile

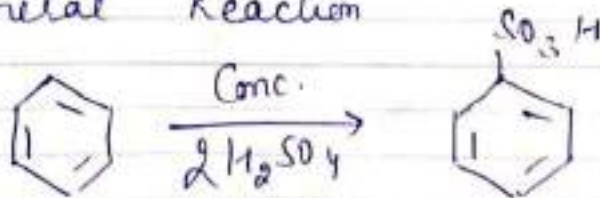


Step 3



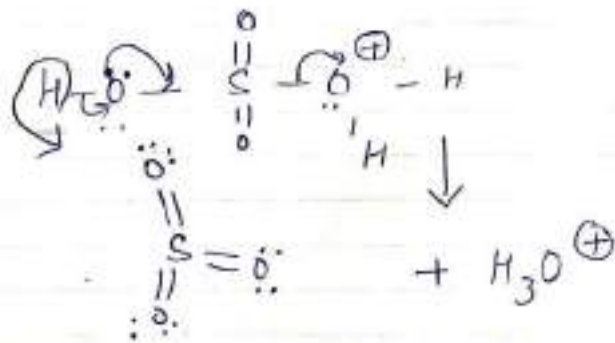
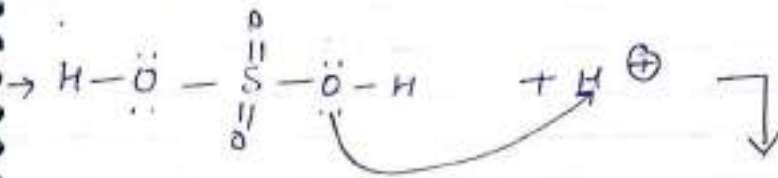
Mechanism of Sulphonation of Benzene

General Reaction

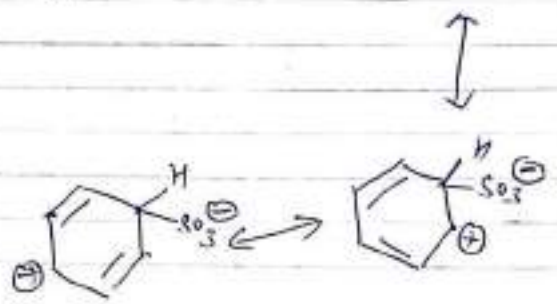
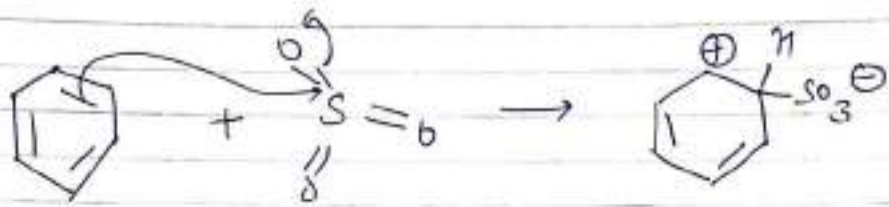


Mechanism

Step 1 Generation of Electrophile

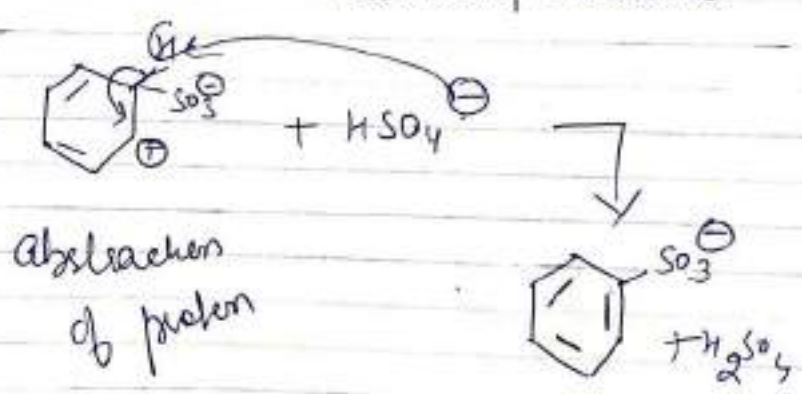


Step 2 Attack of Electrophile on the benzene



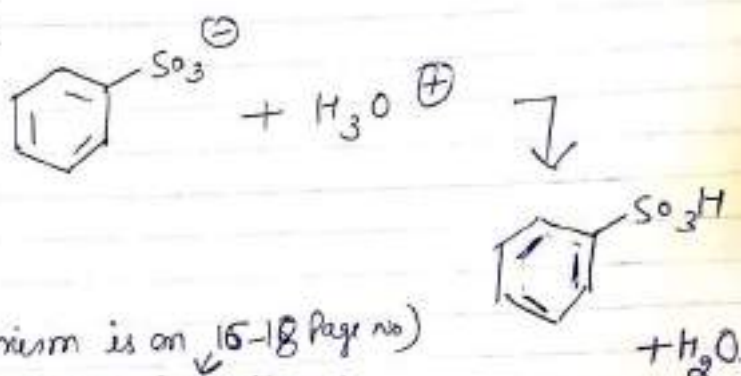
Resonating structures

Step 3



Abstraction of proton

Step 4



(Mechanism is on 15-18 page no)

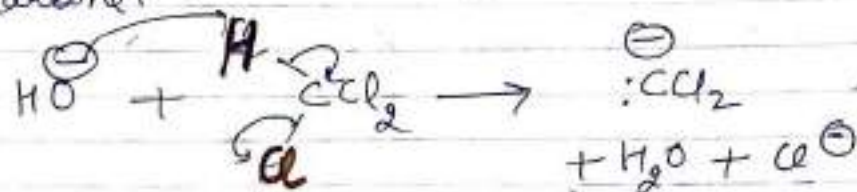
Elimination Reactions

Elimination Reaction is the one which involves the loss of two atoms or group of atoms from same or adjacent atom of a substance leads to the formation of a multiple bond.

Depending upon the relative positions of the atom or groups ~~removed~~ eliminated these Rns are classified as:

(i) α -Elimination Reactions:- When the loss of an atom or group occurs from the same atom of the substrate molecule.

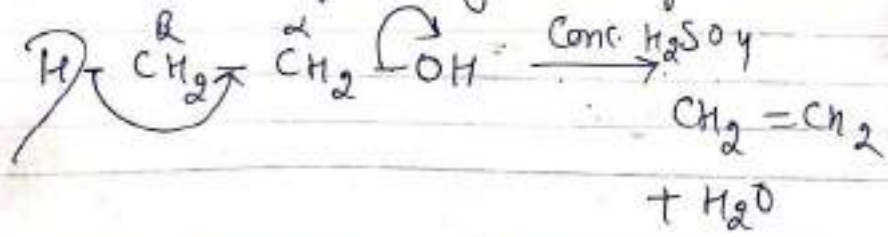
For Exp Base Catalysed dehydrohalogenation of Chloroform to form dichloro-carbene.



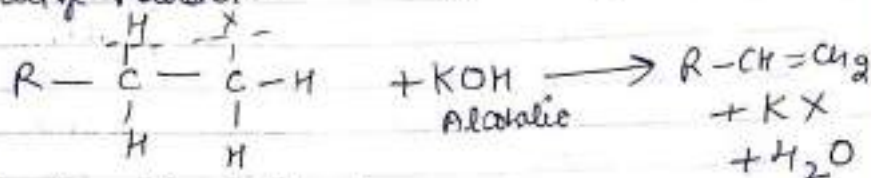
In Reimer-Tiemann Reaction Dichloro-carbene is the reactive intermediate.

(ii) β -Elimination \rightarrow When the loss of atom or group occurs from the adjacent atoms of the substrate molecule.

(i) Acid Catalysed dehydration of alcohols



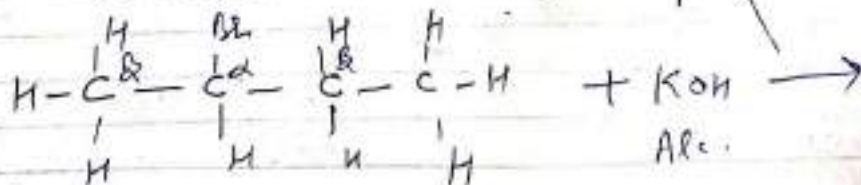
(iii) Base Catalysed dehydrohalogenation of alkyl halides

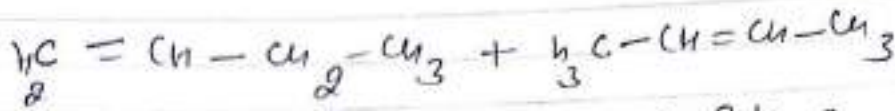


Saytzeff's Rule :-

This Rule states that if the structure of an alkyl halide is such that it can undergo dehydrohalogenation in two different ways, the preferred product is the alkene that contains least number of hydrogen atoms on doubly bonded carbon atoms. The highly substituted alkene is the major product.

For ex^o 2-bromobutane forms 2-butene as a major product.





1-Butane
Minor product
(20%)

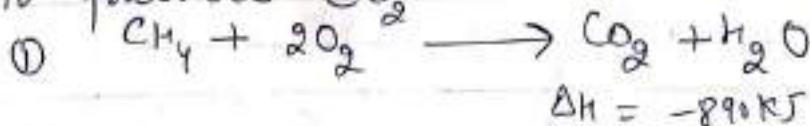
2-Butane
(major product)
(80%)

Order of dehydrohalogenation of alkyl halides is $3^\circ > 2^\circ > 1^\circ$.

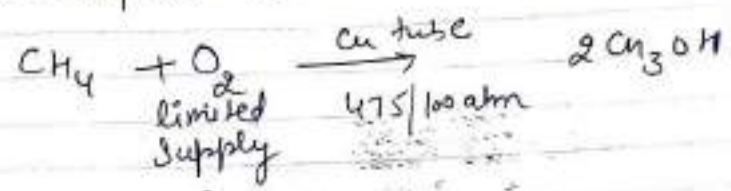
Oxidation Reaction

(i) **Oxidation of Alkanes** :- Oxidation means addition of oxygen. Alkanes undergo combustion reactions.

→ Combustion Reaction means which occurs in the excess of air or oxygen.
→ Alkanes undergo Complete Combustion to produce CO_2 .

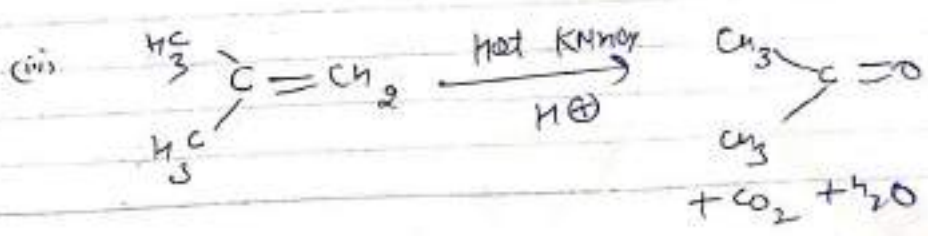
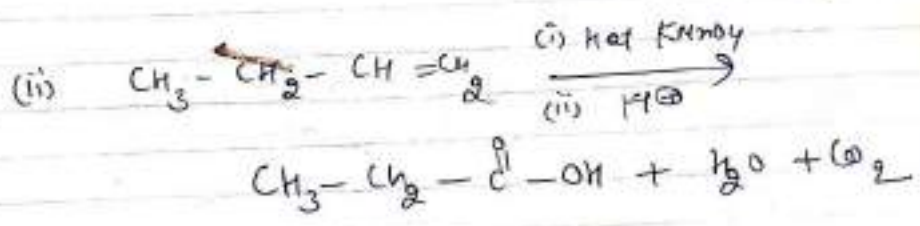
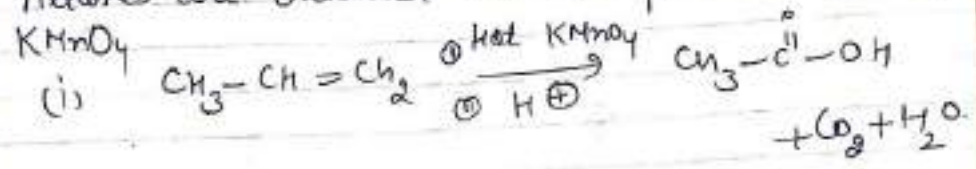


→ Incomplete Combustion can also occur



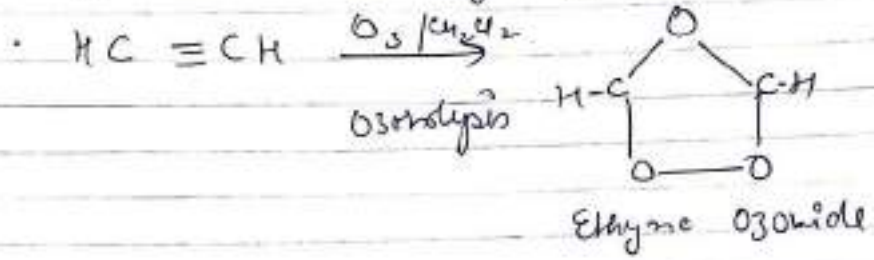
(2) Oxidation of Alkenes (KMnO₄)

KMnO₄ is an oxidising agent
Alkenes are oxidised in the presence of O₂

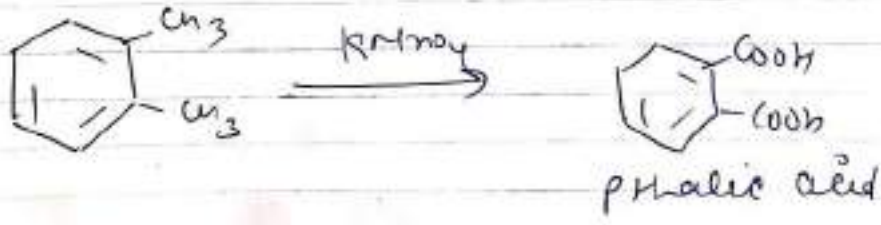
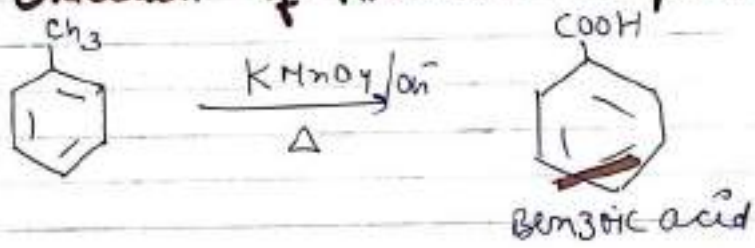


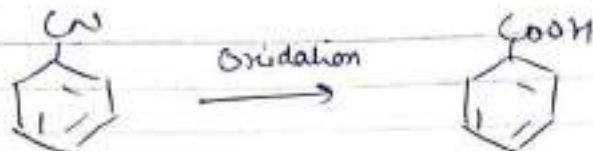
(3) Oxidation of Alkynes (O_3)

O_3 is an oxidising agent



(4) Oxidation of Aromatic Compounds

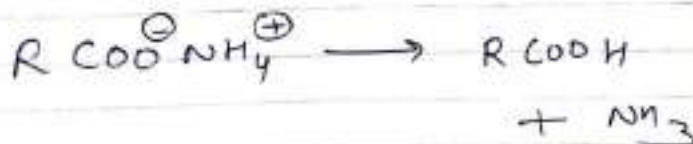
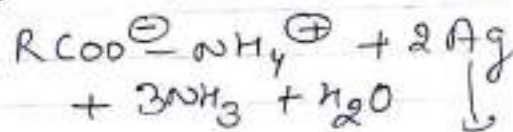
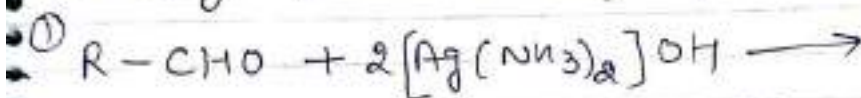




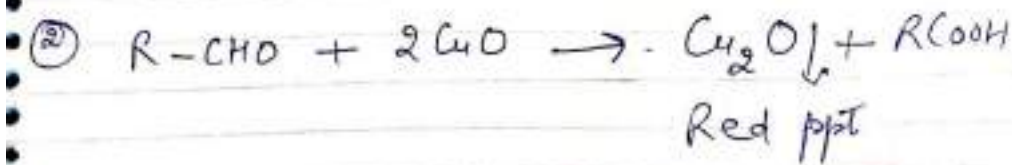
(5) Oxidation of Aldehydes

Aldehydes are easily oxidised to Carboxylic acids.

Ketones can not be oxidised easily as they involve cleavage of C-C bond.



Silver mirror

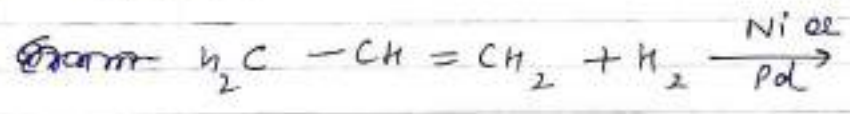
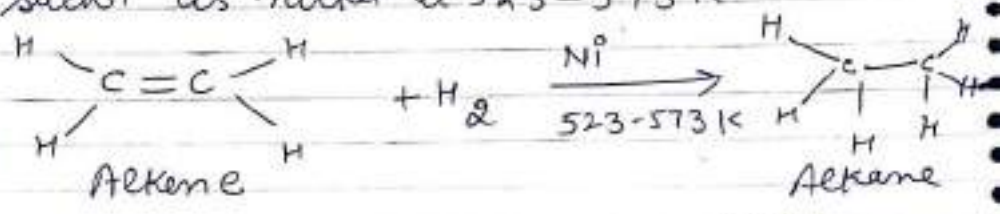


Reduction Reactions

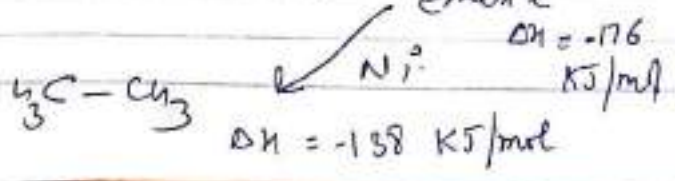
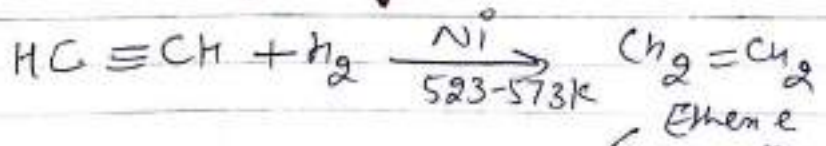
Reduction means addition of hydrogen.

① Reduction of Alkenes (Hydrogenation)

Alkenes react with hydrogen in the presence of finely divided metal such as nickel at 523-573 K.

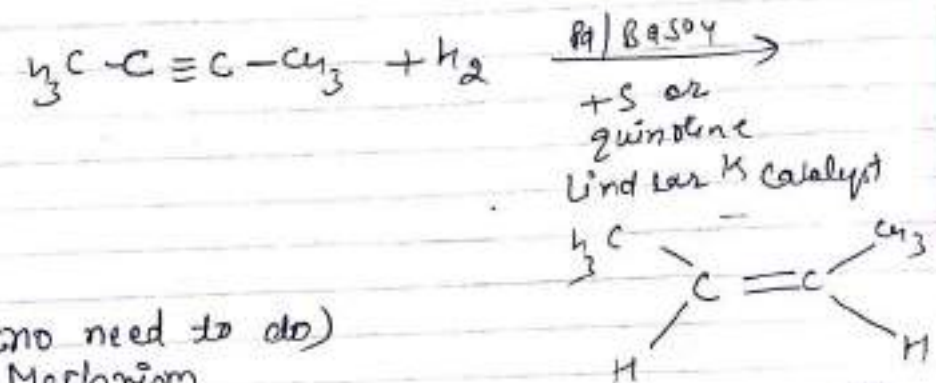


② Reduction of Alkynes

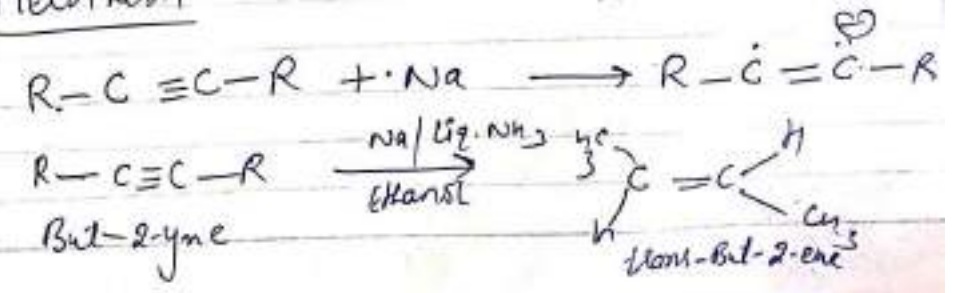


The heat of hydrogenation reveals that the first step has larger ΔH° than the second step and hence alkynes are more readily reduced than alkenes. Thus it is possible to stop the reaction at the alkene by using specific catalyst such as Lindlar's catalyst (Pd over CaCO_3 + BaSO_4 (addition of sulphur and quinoline))

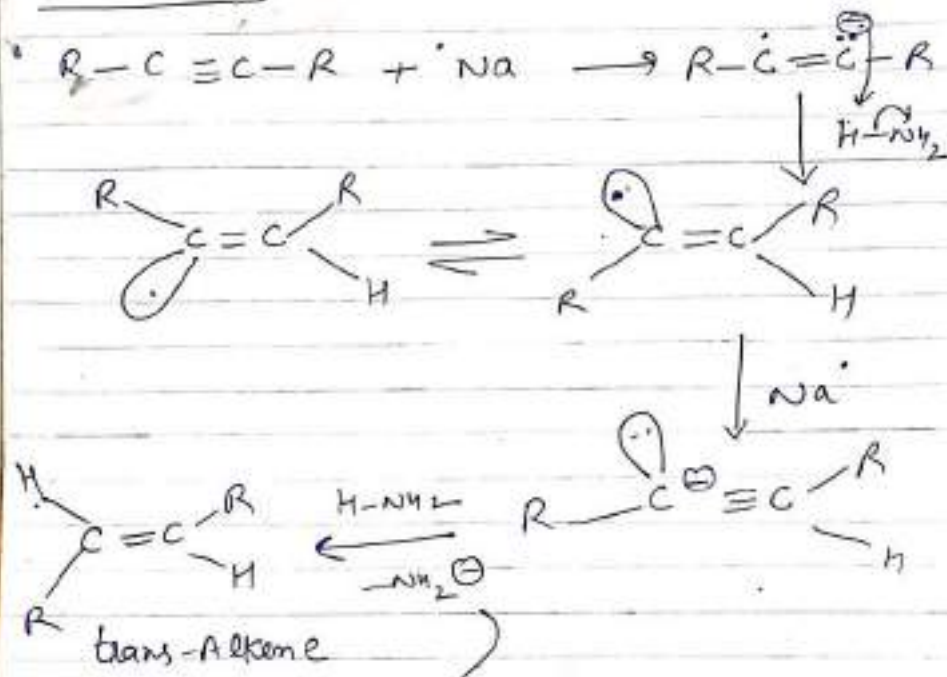
The heat of hydrogenation reveals that the first step has larger ΔH° than the second step and hence alkynes are more readily reduced than alkenes. Thus it is possible to stop the reaction at the alkene by using specific catalyst such as Lindlar's catalyst (Pd over CaCO_3 + BaSO_4 (addition of sulphur and quinoline))



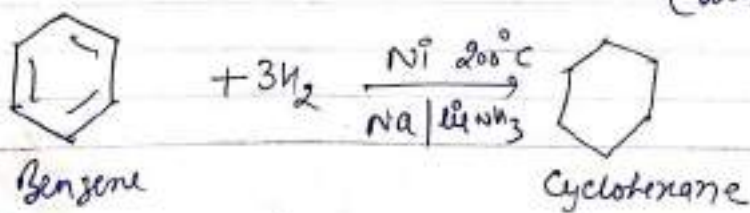
(no need to do)
 (Mechanism)



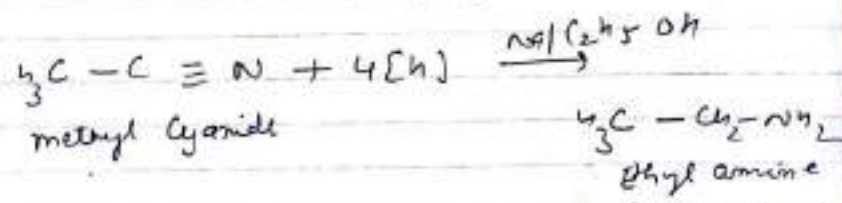
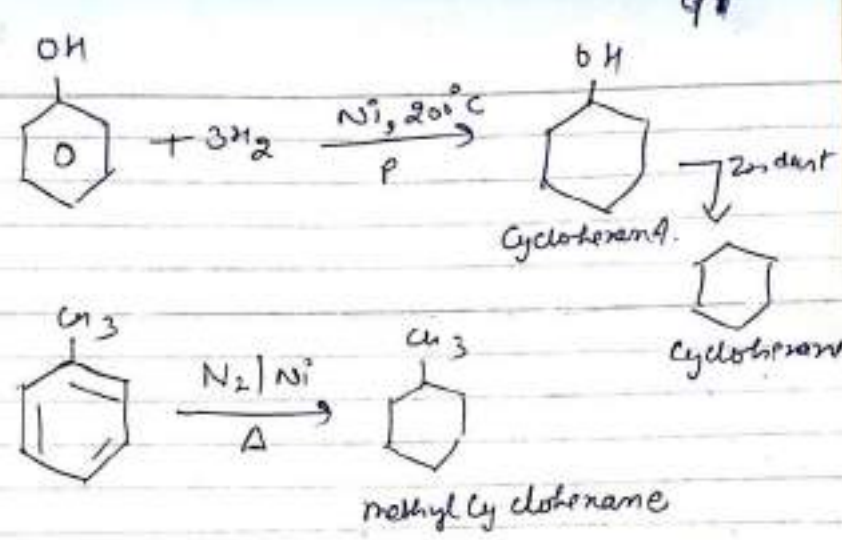
Mechanism



3.) Reduction of Aromatic Compound (Birch Reduction)

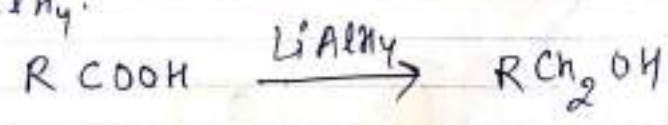


orbital theory) : Molecular orbital
 or hybrid to check the stability of
 atoms. check the stability of
 ex. $O_2 : - O_2 = 16e^-$
 $\pi^* 2p_x = \pi^* 2p_y = \pi^* 2p_z$
 main, it will
 $N_2 = 14e^-$
 $\pi^* 2p_y = \pi^* 2p_z$

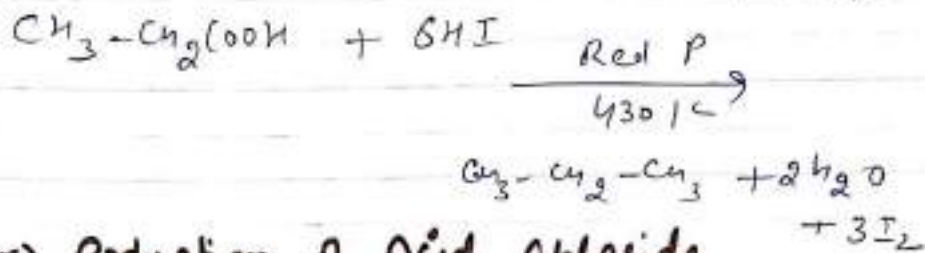
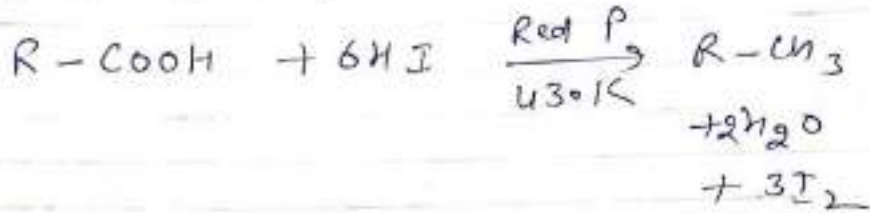


4. Reduction of Carboxylic Acids (Amino ethane)

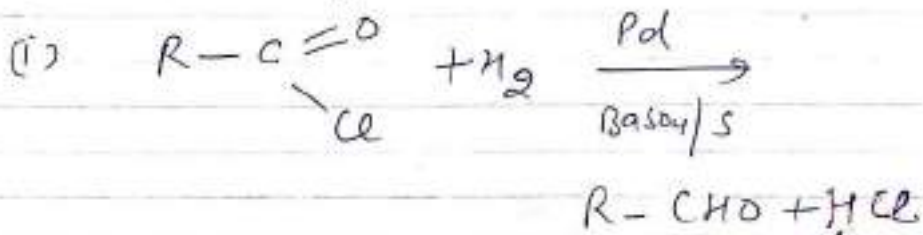
(1) Reduction to alcohols :- Carboxylic acids can be reduced to alcohol by $LiAlH_4$.



(ii) Reduction of Alkanoic Acids



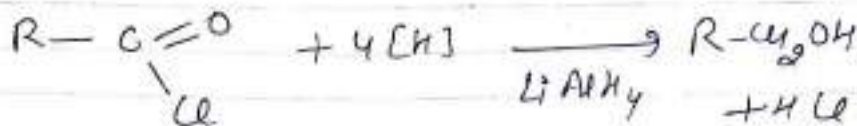
5) Reduction of Acid chloride



Rosenmund's Reduction

Reduction of Aldehydes

(ii) Reduction to alcohols



6) Reduction of Acid Amide



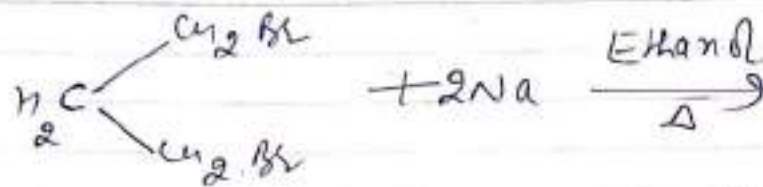
Cyclisation

→ Cyclisation means Ring formation.
 → Open chain leads to closed chain compounds.

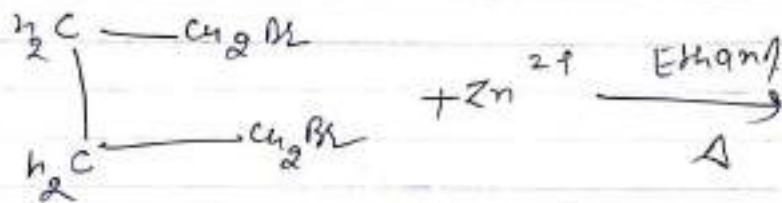
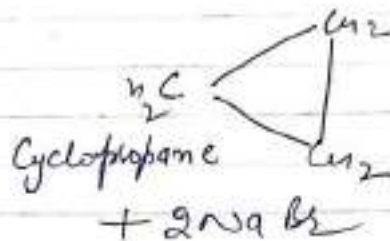
1) Cyclisation of Haloalkanes

Freund's Method :- Dichloro or dibromoalkanes having terminal halogen atoms, when treated with sodium or zinc yield cycloalkanes.

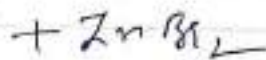
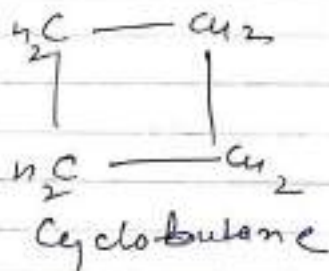
4/4



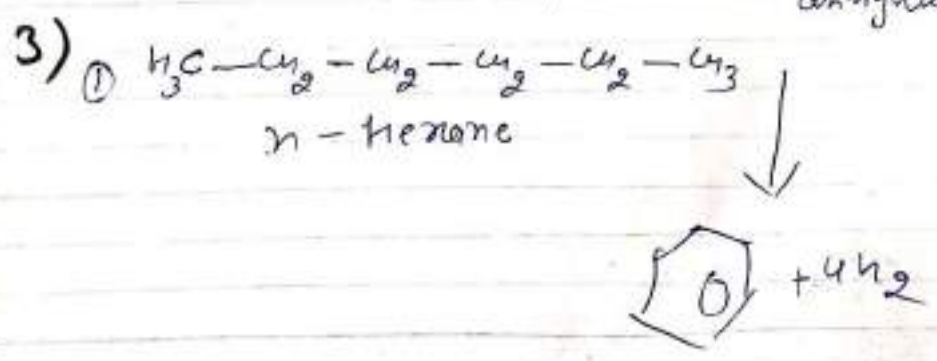
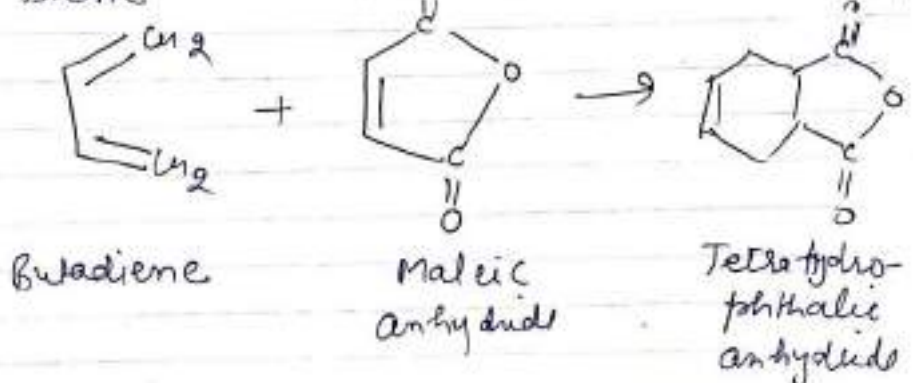
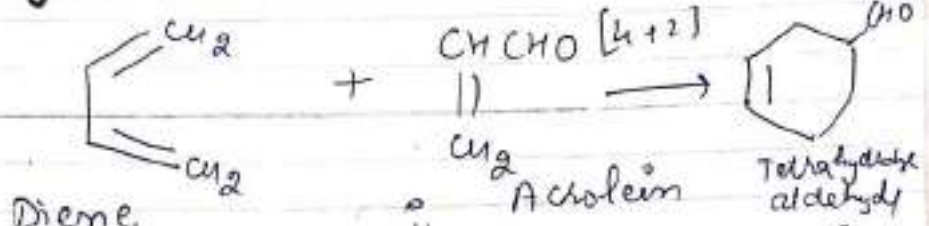
1,3 - Dibromopropane

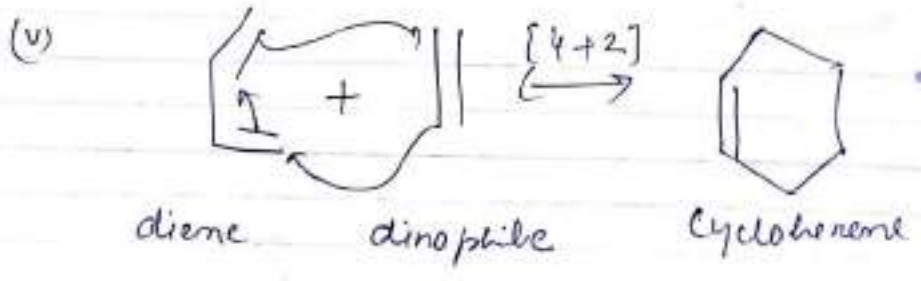
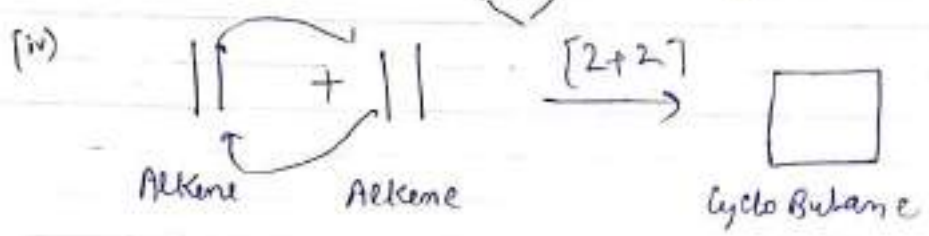
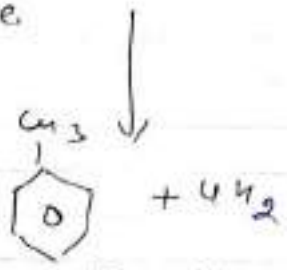
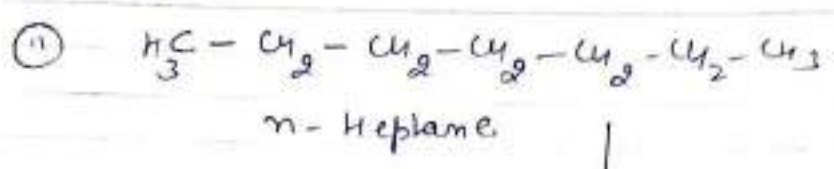


1,4 - dibromobutane



2) Diels-Alder Reaction [4+2] Cyclo addition

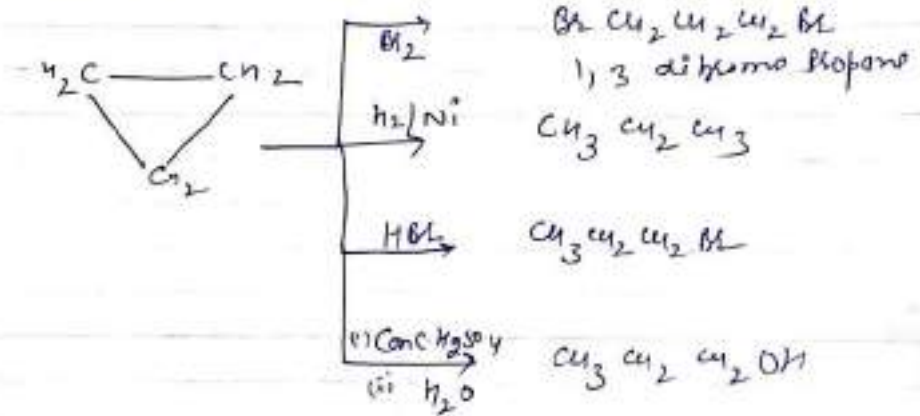




Ring Opening Reactions

→ It means closed ring is converted to ring opening

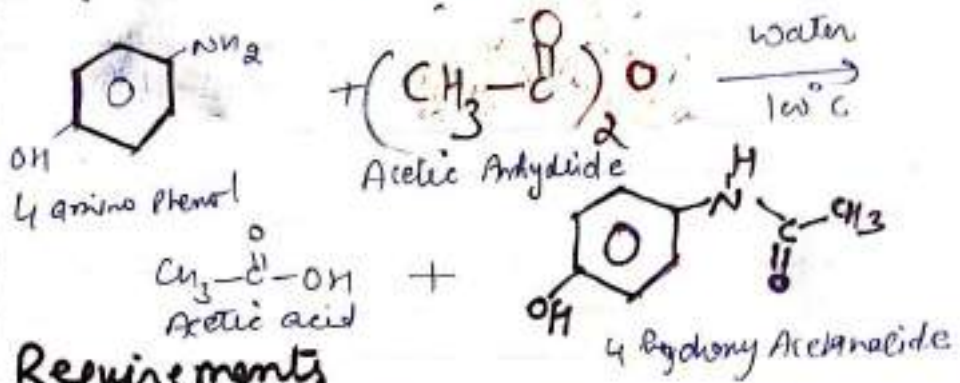
① Cyclopropane is very reactive and undergoes addition reactions



② Cyclobutane is less reactive than cyclopropane and because of less ring strain and do not undergo addition reactions under normal conditions.

- was maintained 50-60°
- (4) Heat on the boiling water for 5 minutes
 - (5) Cool in cold water and pour in to 200 ml of cold water and then separate it
 - (6) Recrystallize to get pure Aspirin

② Paracetamol (PCM) ^{Antipyretic drug}
 Synthesis of PCM or Acetaminophen



Requirements

4 - amino phenol = 9.8 g (90 mm)

Acetic anhydride = 10.0 ml
 Water = 45 ml
 methanol = 25 ml

Procedure

- ① Add 9.8 g of 4-aminophenol and 45 ml of deionised water in a round flask
- ② At room temp, add acetic anhydride
- ③ The flask must be connected to a water condenser and suspended over the oil bath (130°C) for 1 hour
- ④ Dark solution (red to brown) will form
- ⑤ Remove oil bath
- ⑥ Cool the mixture
- ⑦ PCM will start to crystallize
- ⑧ Put over cold water bath for 30 minutes
- ⑨ Separate PCM and recrystallize with CH_3OH .