Chemistry Study Materials for Class 11

(NCERT Based Revision Notes of Chapter- 13)

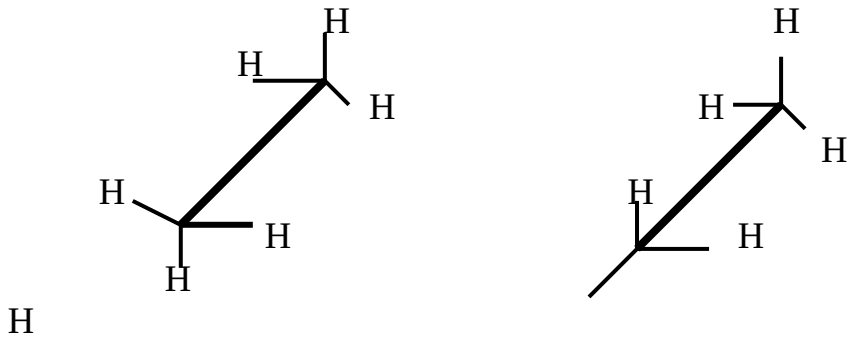
Ganesh Kumar Date:-14/03/2021

❖ CONFORMATIONAL ISOMERISM:

The different molecular arrangements arising as a result of rotation around carbon carbon single bonds are called conformational isomers or rotational isomers and the phenomenon is called conformational isomerism.

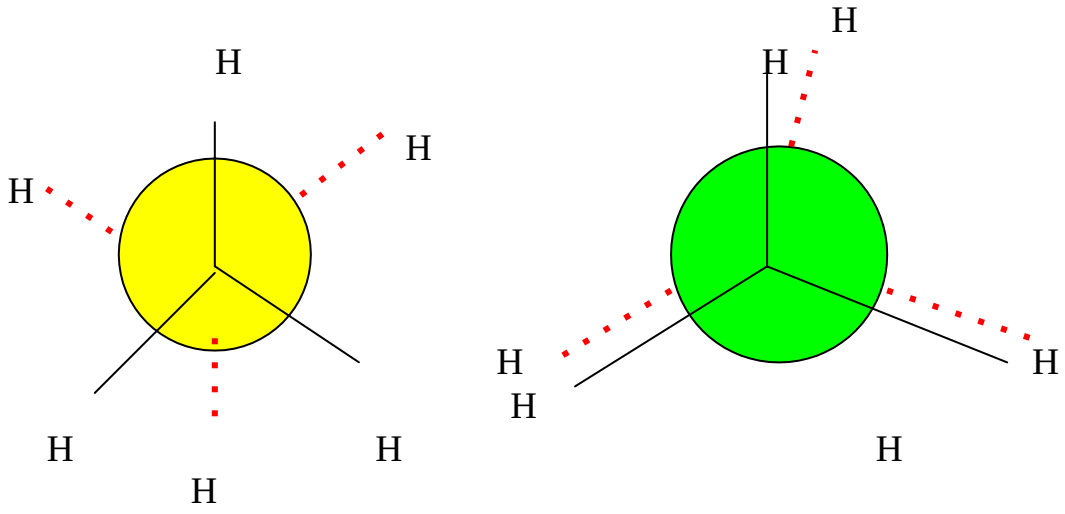
Numerous possible arrangements of ethane are possible. Two extreme conformations are known. These are eclipsed conformation and staggered conformation.

SAWHORSE REPRESENTATION



STAGGERED ECLIPSED

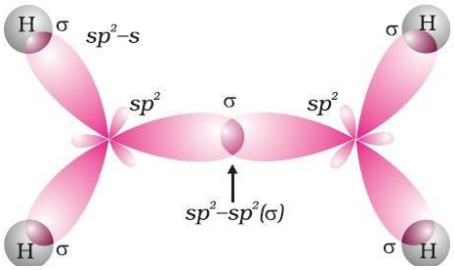
NEWMAN PROJECTION

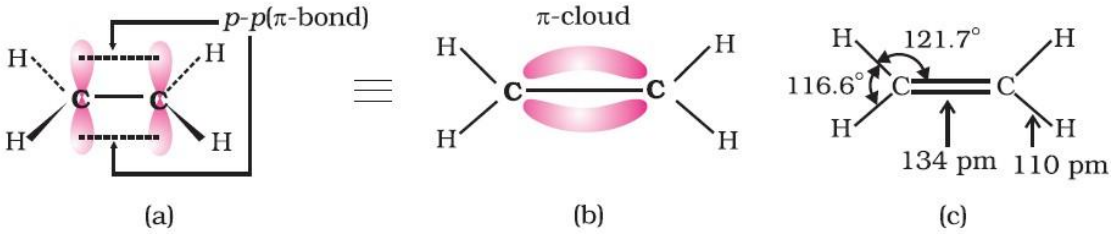


STAGGERED → SKEW ← ECLIPSED

Alkenes

- ☞ Unsaturated hydrocarbon which have double bond.
- ☞ General molecular formula C_nH_{2n}
- ☞ C–C bond hybridization 1.34 A^0
- ☞ sp^2 hybridization
- ☞ When we treated Alkene with chlorine, oily products are obtained. So Alkenes are also known as Olefins. (Greek olefiant meaning oil forming).
- ☞ Show chain, positional and geometrical isomerism
- ❖ Structure of double bond:-





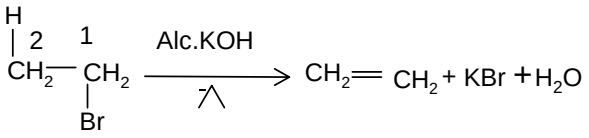
- ❖ **Preparation:-**
  1. From Alkynes:- Alkynes on partial reduction with Partially deactivated palladised charcoal known as *Lindlar's catalyst* give alkynes.

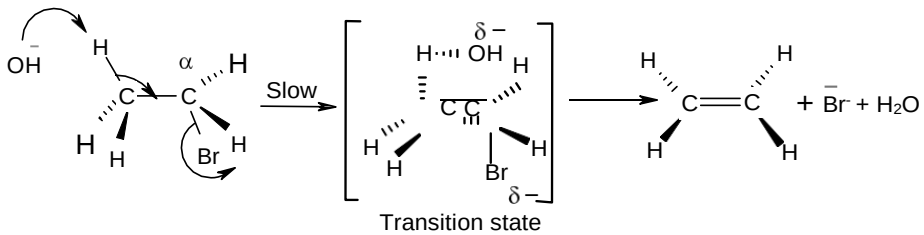
$$CH{\equiv}CH + H_2 \xrightarrow{Pd/C} CH_2{=}CH_2$$

Ethyne → Ethene

  2. From Haloalkanes: - dehydrohalogenation
     (E_2 or 1,2-elimination or Bita-elimination)

Mech

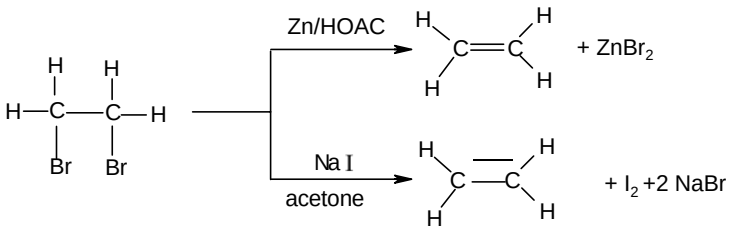




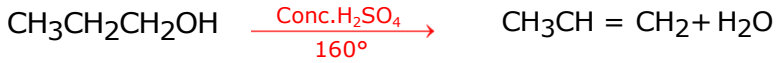
- ➢ predominant formation of a substituted alkene is formed according to Saytzeff's rule

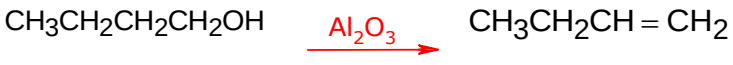
$$CH_3 - \underset{\displaystyle Br}{\underset{|}{CH_2}} - CH_2 - CH_3 \xrightarrow{\text{Alc. KOH}} \underset{\text{Major}}{CH_3 - CH = CH - CH_3} + \underset{\text{Minor}}{CH_3 - CH_2 - CH = CH_2}$$

3. From Dihaloalkanes: - dehalogenation

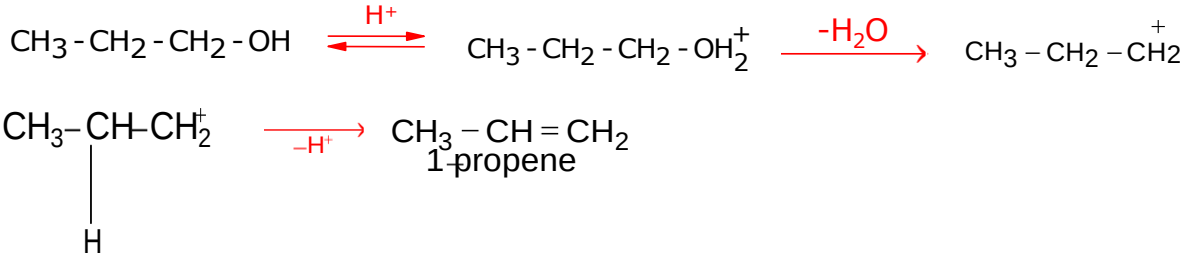


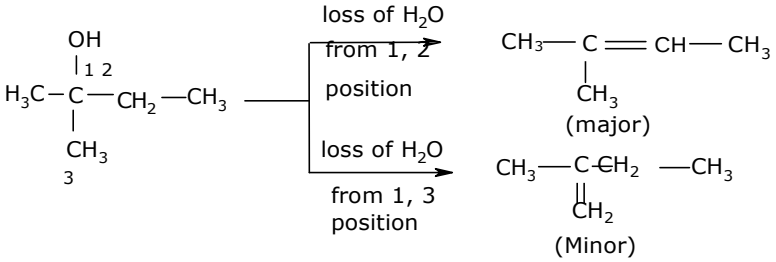
4. From Alcohols:- Dehydration
(E1 - elimination)





Mechanism

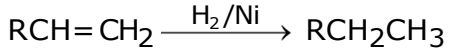




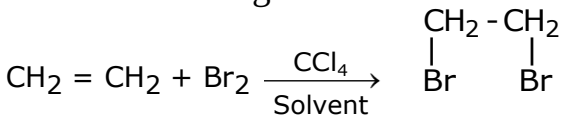
❖ <u>Chemical Properties:-</u>

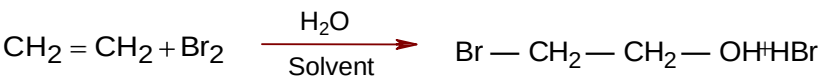
❶ Addition Reaction:- Alkene show electrophilic addition reaction.

1. Addition of Hydrogen:-



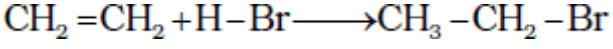
2. Addition of Halogens:-





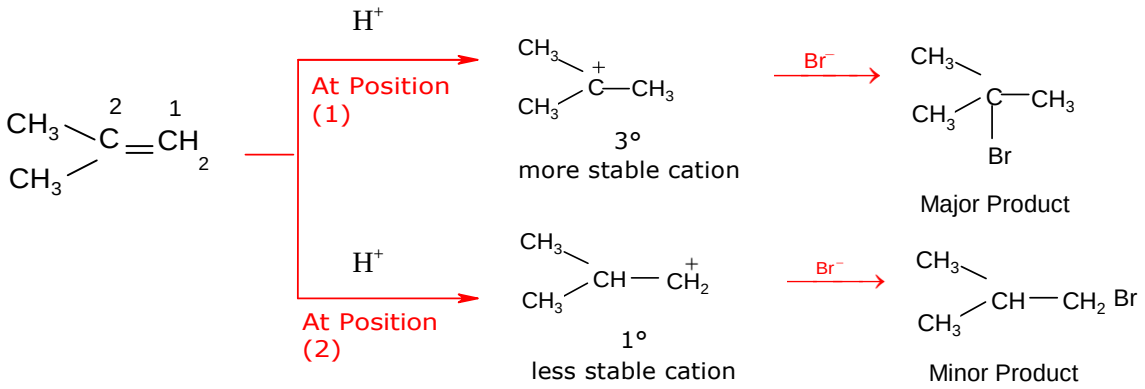
(Brown colour) (Colourless)

3. Addition of hydrogen halides-
Addition reaction of HBr to symmetrical alkenes

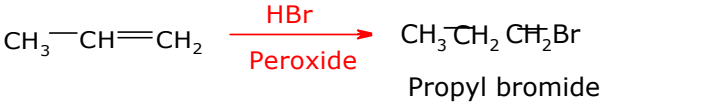


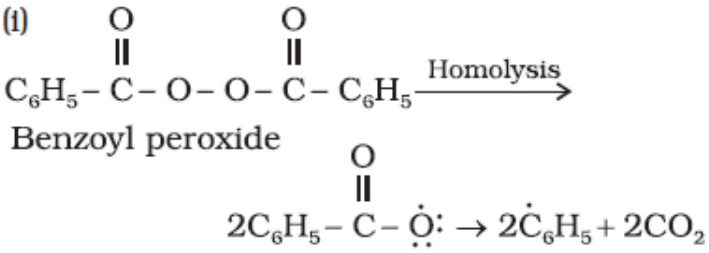
Addition reaction of HBr to unsymmetrical alkenes takes place according to Markovnikov Rule

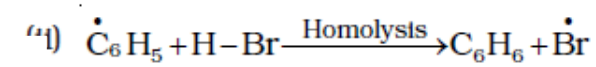
Markownikov rule:- negative part of the addendum (adding molecule) gets attached to that carbon atom which possesses lesser number of hydrogen atoms. e g

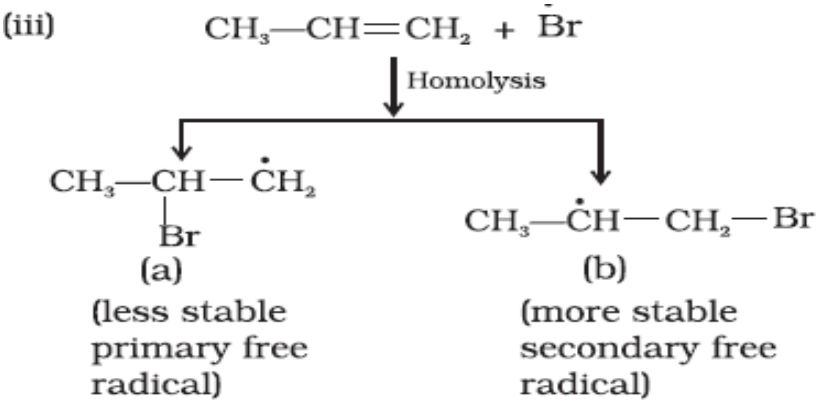


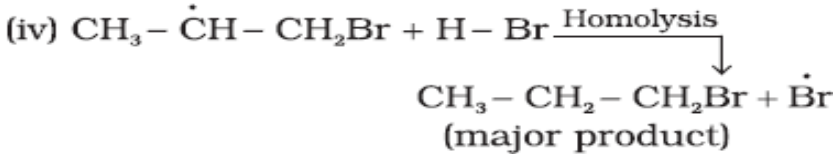
Peroxide effect or Kharasch (Anti Markownikoff's addition):- In 1933 Kharasch and Mayo observed that when HBr is added to an unsymmetrical double bond in the presence of organic peroxide, the reaction take places opposite to the Markovnikov rule.





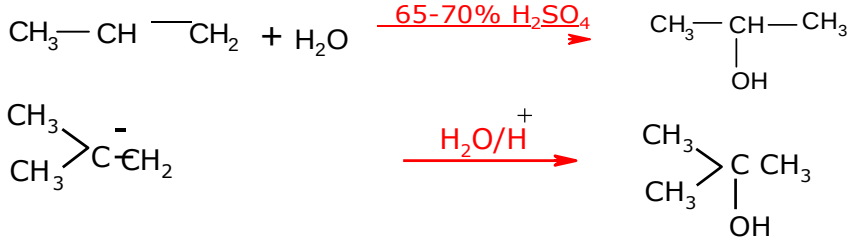






Noted:- peroxide effect is applicable only to HBr and not to HF, HCl and HI. Addition of HF, HCl and HI takes place according to Markovnikov's rule even in the presence of peroxide.

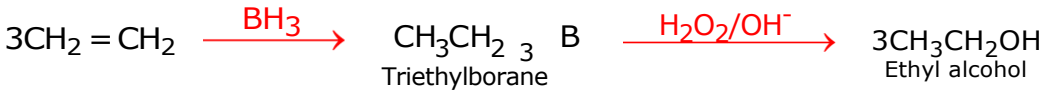
4. Addition of water (Hydration):- Acid catalyzed addition of water



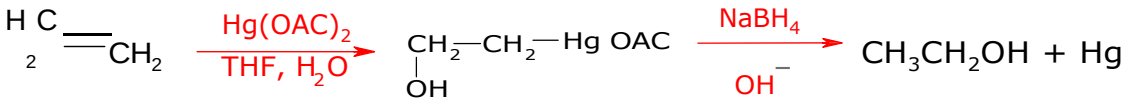
❷ Oxidation:-

① Combustion:- $CO_2 + H_2O$

② Hydroboration–oxidation:- Alkanes react with diborane to form trialkyl boranes which on oxidation with alkaline H_2O_2 give alcohols.

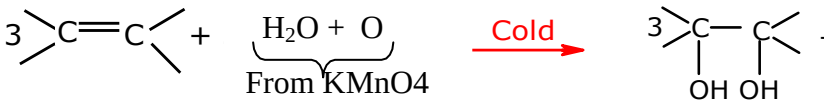


③ Oxymercuration–demercuration:-



④ Oxidation with potassium permanganate:-

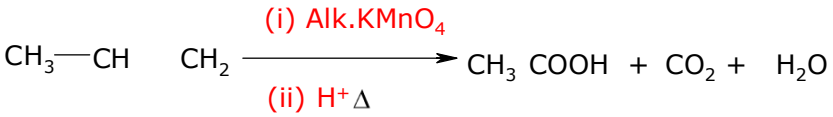
$$2KMnO_4 + H_2O \longrightarrow 2KOH + 2MnO_2 + 3[O]$$



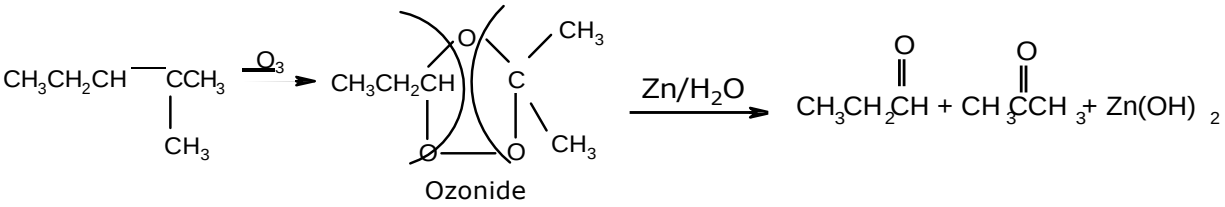
(pink Colour) (Colourless)

- This reaction is also called *Hydroxylation*
- *Cis product I.e. cis*-diol is obtained.

Noted:- The alkaline potassium permanganate solution is known as Baeyer's reagent. It has bright pink colour. It oxidizes alkenes to glycols which is colourless. This reaction is used as a test for the presence of double bond in a molecule. This is also known as Baeyer test.



☺ Oxidation with Ozone:- Ozonolysis – give carbonyls compounds



Noted:- Bromine water test and Baeyer's test are used to detect the presence of double bond while ozonolysis is used to detect the position of double bond.