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HYDROCARBONS

CLASSIFICATION OF HYDROCARBONS: HYDROCARBON

Acyclic or Aliphatic
(Open chain)

Cyclic or Aromatic

Alkane

Alkene Alkyne

Aromatic

Alkanes

Preparation of Alkanes

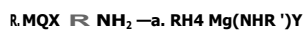
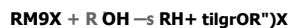
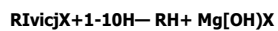
(1) **Metz** reaction



Frankland reaction



(2) **Frankland** reagent (RIM g>f)



(3) From unsaturated hydrocarbons :-

Sabotier-Senderens reduction

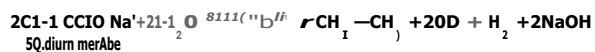


4. From carboxylic acids-

Decarboxylation -



Kolbe's electrolytic method -



Reactions

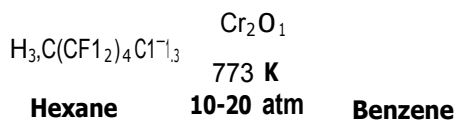
Combustion



Oxidation :-



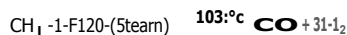
Aromatization



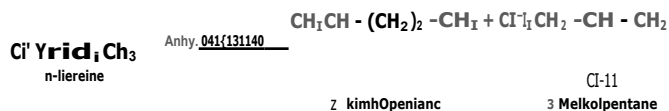
(6) Thermal decomposition or Pyrolysis or **cracking** or **Fragmentation** - when higher alkanes are heated at high temp (about 700 - 800 °C) in the presence of alumina or silica catalysts, the alkanes break down to lower alkenes and alkanes.



(7) Action of steam ; - Catalyst ; nickel, alumina Al₂O₃



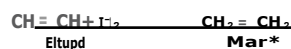
Isomerization



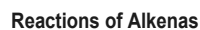
Alkenes

Preparation

1, From Alkynes : - Alkynes on partial reduction with partially deactivated palladised charcoal known as Lindlar's catalyst give alkynes.



2, From Haloalkanes : dehydrohalogenation with KOH or 1, 2-elimination of HBr or HCl .

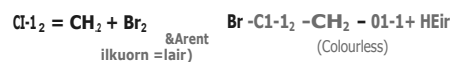


(1) Addition Reaction :- Alkene show electrophilic addition reaction.

1. Addition of Hydrogen :-



2. Addition of Halogens :-

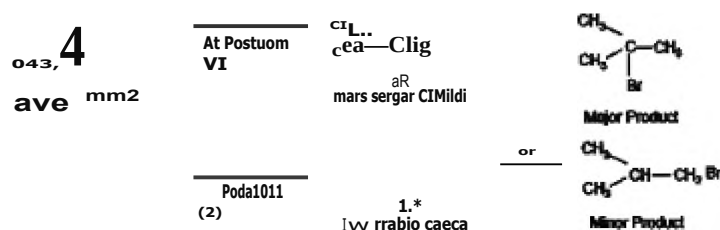


1 Addition of hydrogen halides –

Addition reaction of Her to symmetrical alkenes



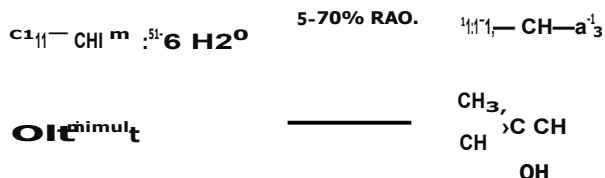
Markovnikov's rule :- negative part of the addendum (adding molecule) gets attached to that carbon atom which possesses lesser number of hydrogen atoms. E.g.



Peroxide effect or Kharasch (Anti Markovnikov'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 takes place opposite to the Markovnikov's rule.



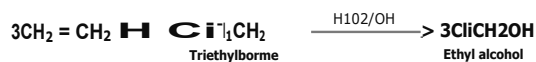
4. Addition of water (Hydration);- Acid catalyzed addition of water



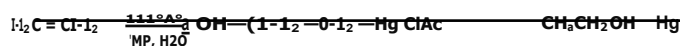
2- Oxidation :-

1. Combustion $\text{CO}_2 + \text{H}_2\text{O}$

Hydroboration-oxidation - Alkenes react with dihydroborane to form trialkyl boranes which on oxidation with alkaline H_2O_2 give alcohols.



3- OsO₄ mercuric-mercuration

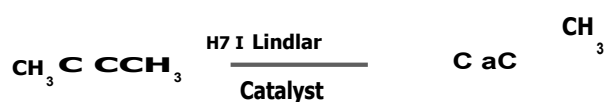


4, Oxidation with potassium permanganate :-



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Birch Reduction



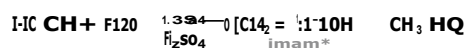
2_ Addition of Halogens



Addition of hydrogen halides



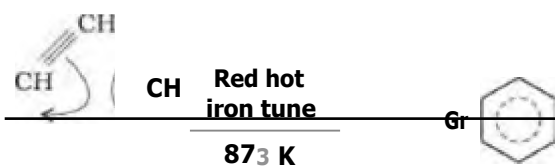
4- Addition of water {Hydration}:- Acid catalyzed addition of water



5_ Polymerisation -

{a} Linear polymerization ; of ethyne gives polyacetylene or polyethyne which is a high molecular weight polyene containing repeating unit of $(\text{CH}=\text{CH}-\text{CH}=\text{CH})_n$ and can be represented as $-\text{CH}=\text{CH}-\text{CH}=\text{CH}-$

{13} Cyclic polymerization results in the formation of aromatic compound.



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Aromatic 1-1v€1 roca rbon

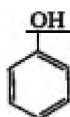
Preparation of Benzene

(i) DeCartm)PelatiOn of aromatic acids.

C DONa

+ Naar.] Ca.(.)

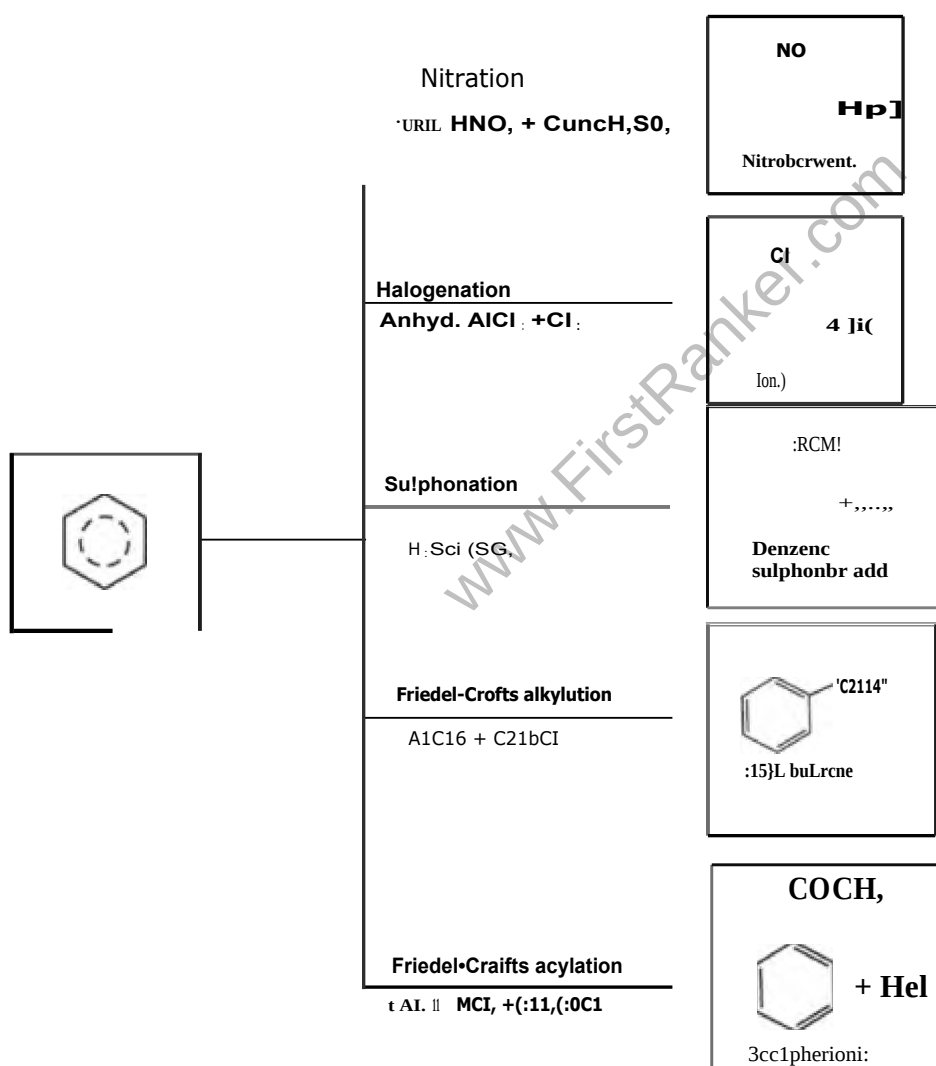
(ii) Reduction of phenol: Phenol is reduced to benzene by passing its vapours over heated zinc dud



+ ZnO

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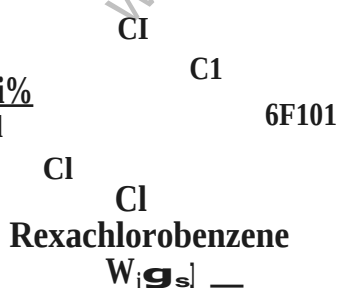
UOISSIUIPV MOSUOV



Benzene on treatment with excess of chlorine in the presence of anhydrous AlCl_3 in dark yields hexachlorobenzene ($\text{C}_6\text{H}_2\text{Cl}_6$)



Maw & Ai%
dark, cold



Like the influence of a functional group in substituted benzene :-

1. Ortho and Para directing groups and activating

-OH, -NH₂, -CH₃, -OCH₃, -CH₂, -C₂H₅ etc.

2. Meta directing group and deactivating :-

-CN, -COP, -COOH, -NO₂, -SO₃H, -R

3. Ortho and para directing groups and deactivating — Halogens because of their strong -I effect, overall

electron density on the ring decreases. However due to resonance the electron density at ortho and

p-position is greater than that at the m-position. Hence, they are ortho and para directing.