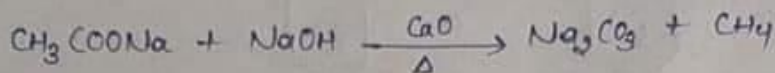
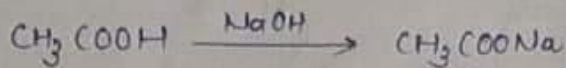


DECARBOXYLATION REACTION →

→ Reformation of Alkane from carboxylic acid by removal of CO_2 is called decarboxylation reaction.

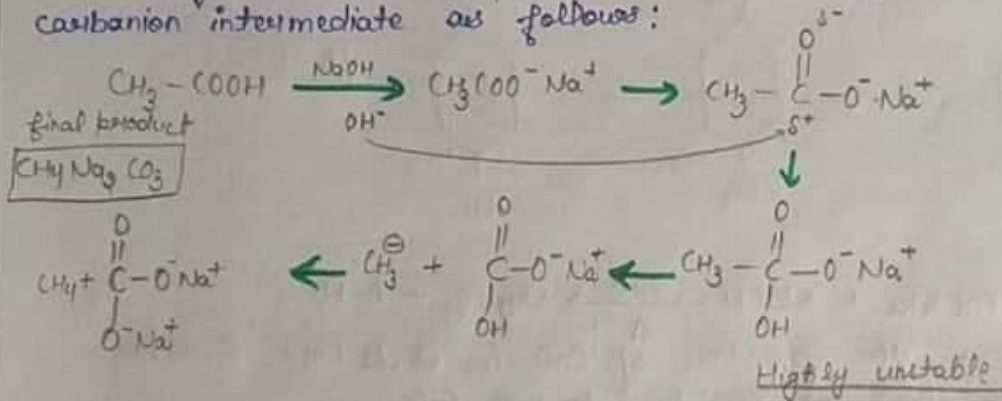
→ This process is also known as **soda-lime method**.

→ Soda-lime is a mixture of **NaOH & CaO**



Soda + lime
carboxylic acid
↓ $-\text{CO}_2$
Alkane

→ Decarboxylation reaction proceeds via the formation of carbanion intermediate as follows:

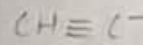
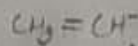
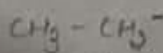
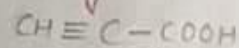
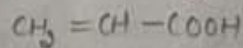
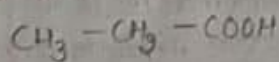


Imp Point →

→ Carbanion is formed as intermediate in decarboxylation reaction.

→ Rate of decarboxylation \propto stability of Carbanion.

→ Give the reactivity order of the following



sp^3

sp^2

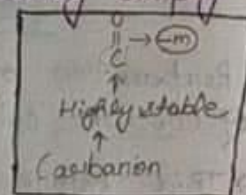
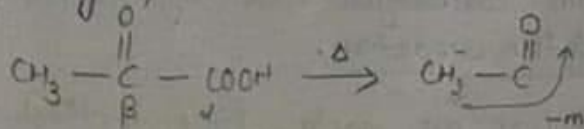
sp

less en

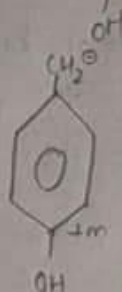
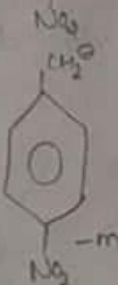
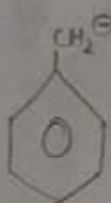
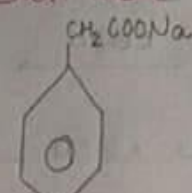
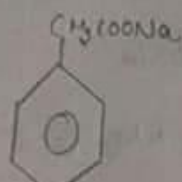
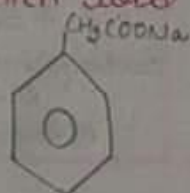
$\boxed{\text{III} > \text{II} > \text{I}}$

more en

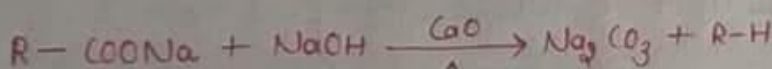
→ Beta-keto acids are decarboxylated readily simply heating, soda lime is not required.



Which will give soda lime reaction more faster?



B > A > C

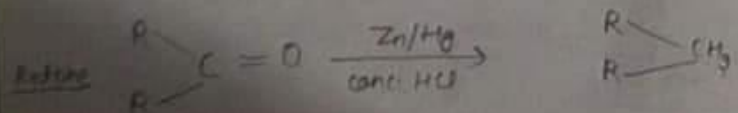
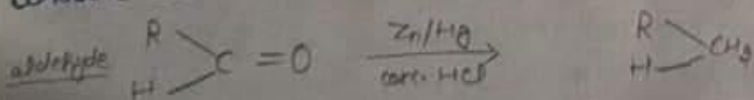


What is the function of CaO in soda lime reaction?
→ CaO also eliminates CO₂ by forming CaCO₃

Alkane from Aldehyde / Ketone

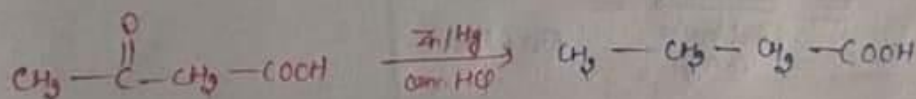
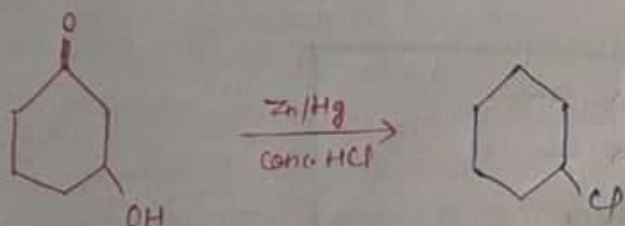
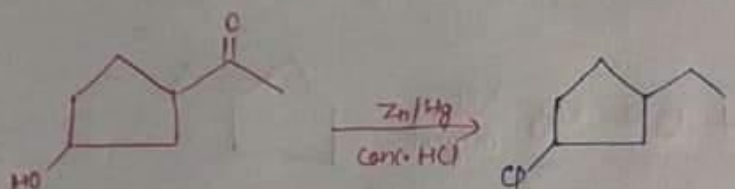
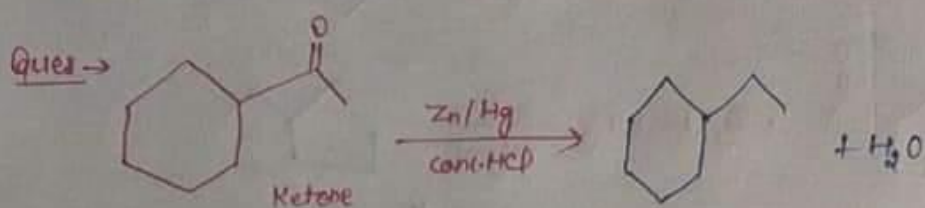
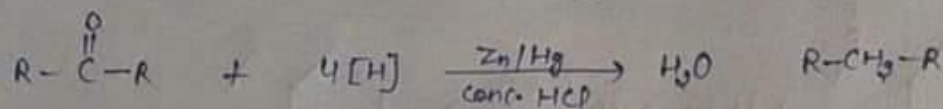
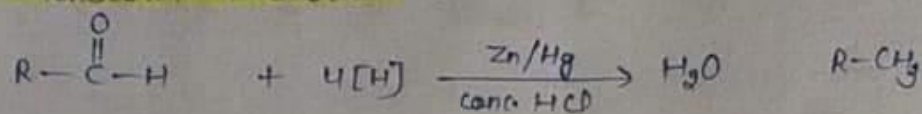
Clemmensen Reduction →

Reduction reaction of carbonyl compounds (Aldehyde/Ketone) in the presence of metal under acidic condition to form alkane is called Clemmensen reduction.



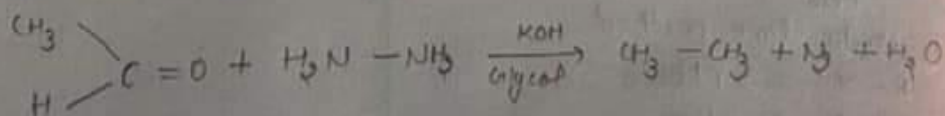
Clemmensen AK जीत
होगा Acidattack

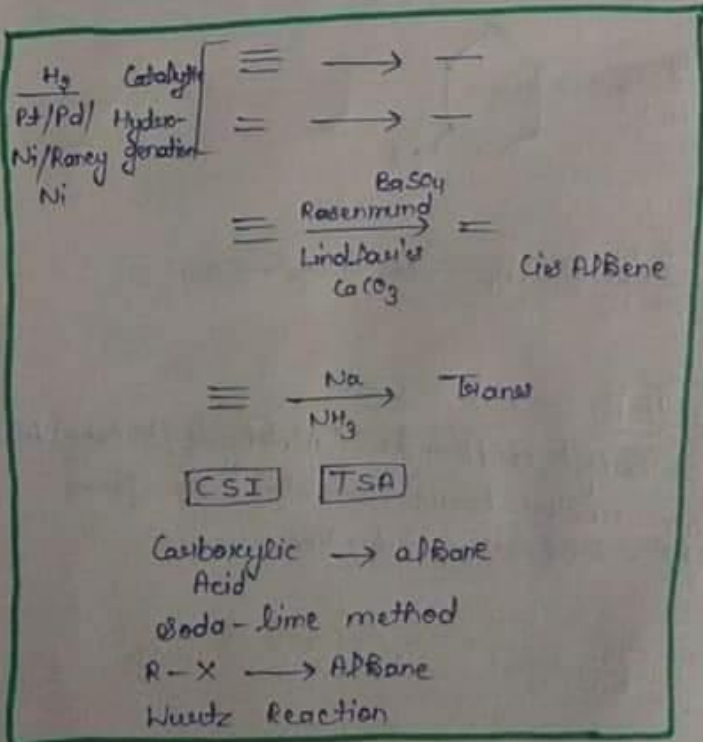
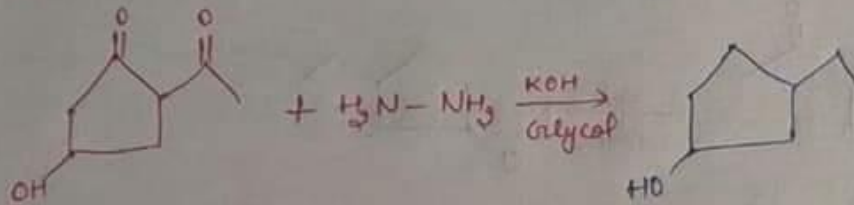
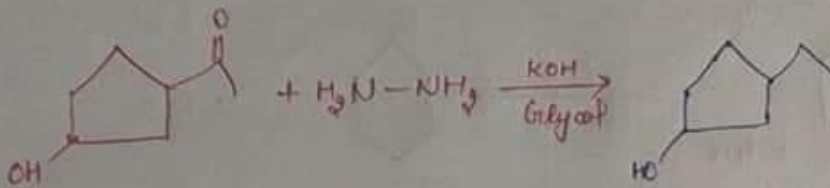
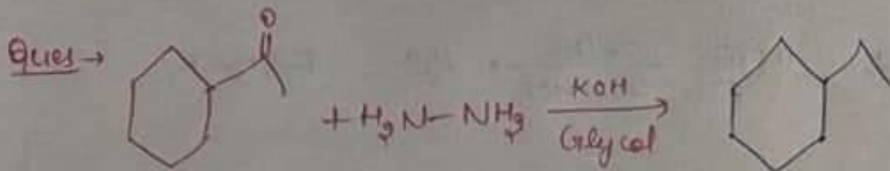
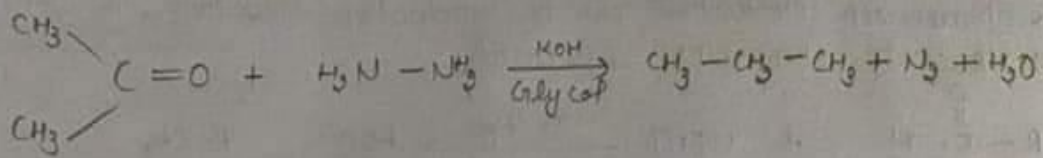
→ Clemmensen reduction is a reduction reaction, in which **4 NASCENT HYDROGEN** is used.



Wolff-Kishner reduction :-

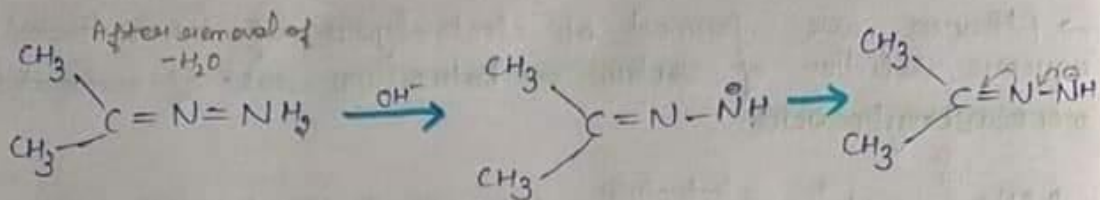
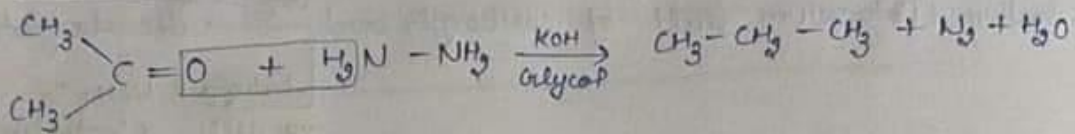
Reduction reaction of carbonyl compounds (Aldehyde/Ketone) in the presence of Hydrazine under basic condition to form alkane is called Wolff-Kishner reduction.





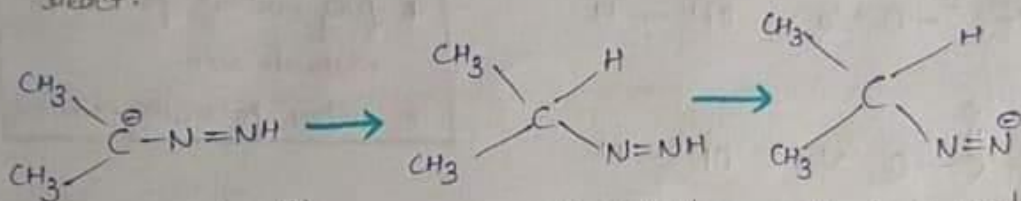
MECHANISM - CLEMMESEN REDUCTION

WOLFF-KISHNER



Hydrogen close to N is acidic so OH^- from base will react.

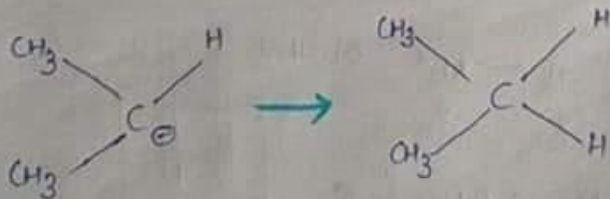
Here we have conjugation



On $-ve$ charge H^+ will attack. H^+ will be from glycol.

Hydrogen close to N is acidic so OH^- from base will react.

N_2 is a good leaving group



Minus H^+

Alkane

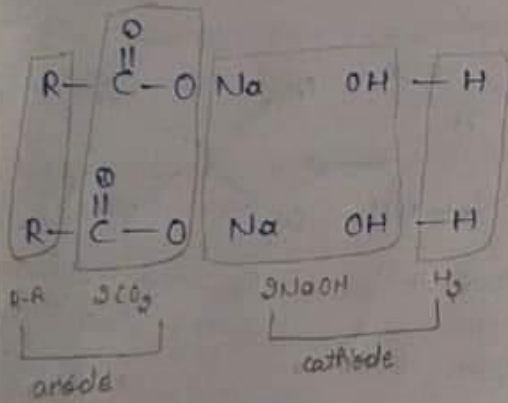
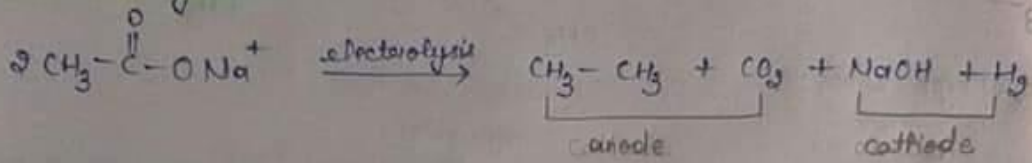
KOLBE'S ELECTROLYSIS →

Carboxylic acid → Alkane

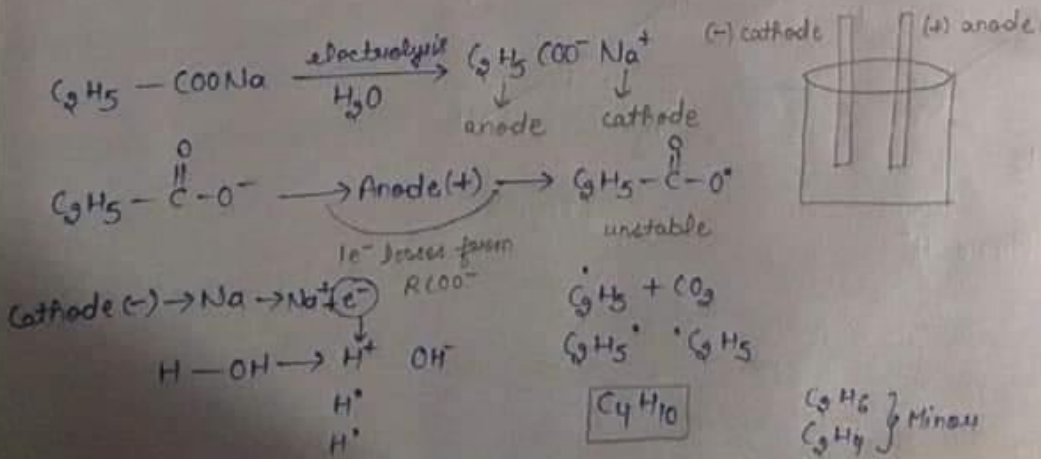
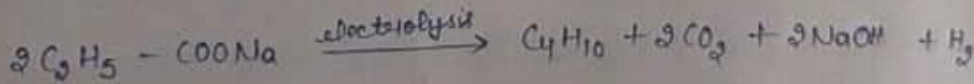
Sodium / Potassium salt of carboxylic acid

dry distillation → decarboxylation
 electrolysis (aq. soln) → Kolbe's electrolysis

→ Alkanes are formed on electrolysis of concentrated aqueous solution of sodium or potassium salt of saturated monocarboxylic acid.



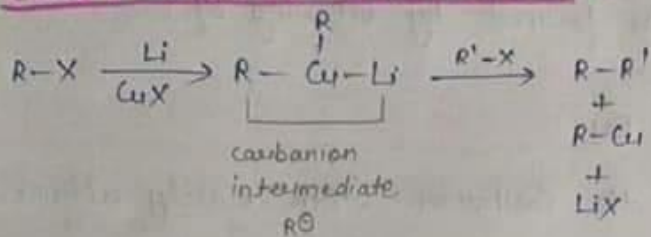
* free radical formation
 ↓
 disproportion
 * ester formation → minor



Carboxylic acid \longrightarrow Alkane

- ① Decarboxylation / soda lime (dry distillation)
- ② Kolbe's electrolysis (H_2O electrolysis)
(free radical)

COREY-HOUSE SYNTHESIS \rightarrow



\rightarrow Carbanion is intermediate.

\rightarrow In Corey-House synthesis reaction, symmetrical & unsymmetrical alkane can be formed.

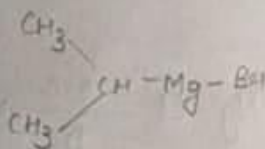
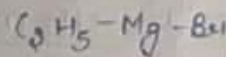
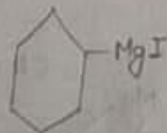
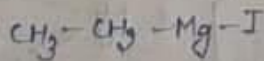
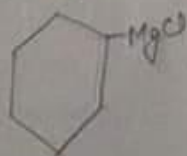
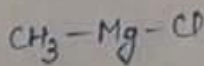
Ques \rightarrow Which of the following reaction cannot be used to obtain propane?

- Ⓐ Wurtz reaction (✓)
- Ⓑ Corey House reaction
- Ⓒ Decarboxylation of Acid salt
- Ⓓ All of these

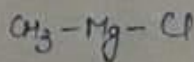
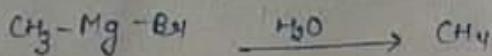
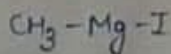
Preparation of Alkane from Organometallic compounds.

Grignard reagent :- Any alkyl which is directly bonded with Mg & Halogen is called Grignard reagent (GR)

\rightarrow It is represented as $R-Mg-X$



Ques → Which will give Grignard Reaction faster



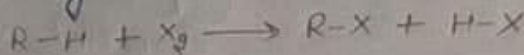
I > Br > Cl (Tendency of leaving group)

HALOGENATION OF ALKANES →

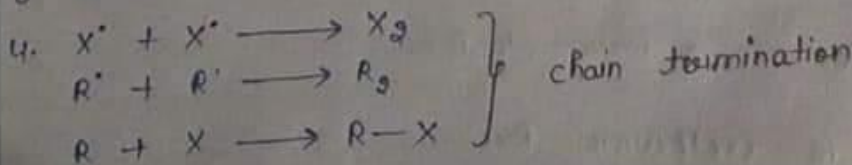
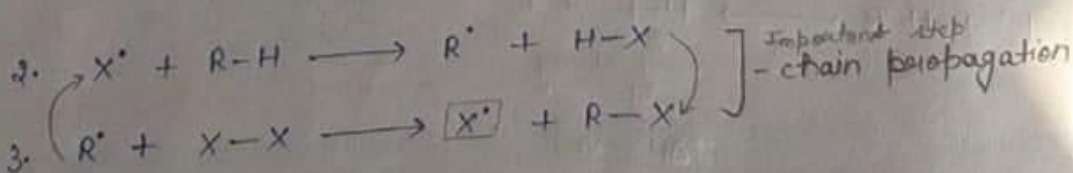
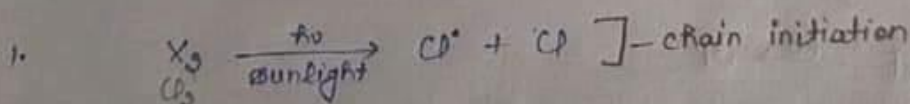
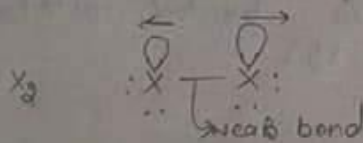
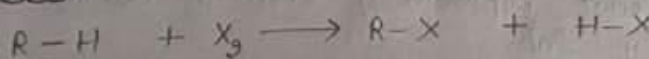
This is a substitution reaction bcoz Hydrogen is substituted by halogen.



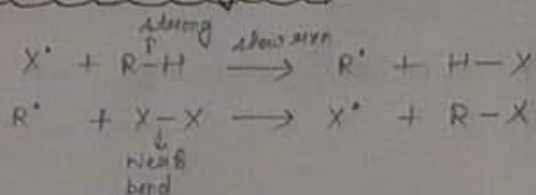
alkanes



Mechanism :-

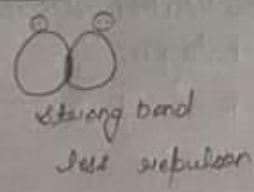
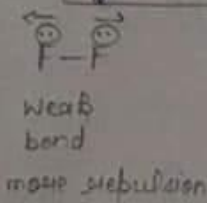
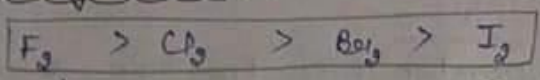


Rate Determining step →



→ **Allylic free radical**

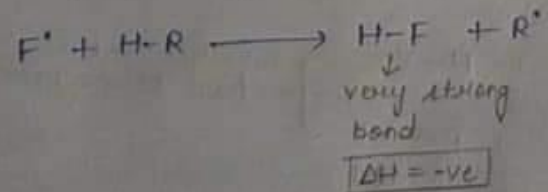
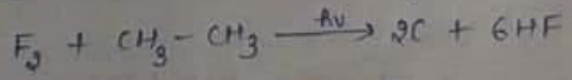
Reactivity order :-



We will study halogenation in the below given order:-

Fluorination :- React explosively even in dark. So, it is not conducted in lab.

→ Fluorination is done when alkane is treated with F_2 diluted with an inert gas (like N_2).

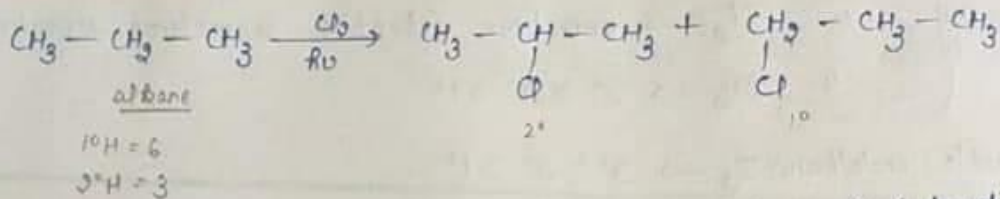


less stable → more stable

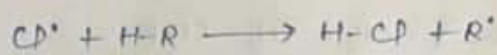
Fluorination is exothermic Rxn.

selective rxn - $1^\circ > 2^\circ > 3^\circ$

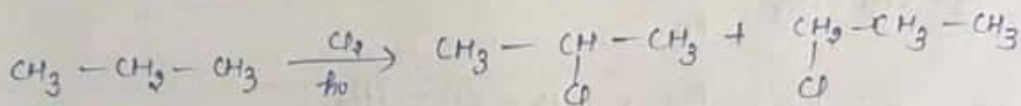
Chlorination →



→ It is a non-selective reaction. (do not select particular Hydrogen)



→ We can also calculate % of chlorinated products



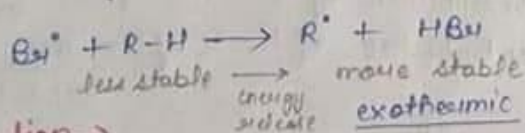
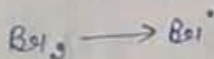
$1^\circ \text{H} = 1$
 $2^\circ \text{H} = 3.8$
 $3^\circ \text{H} = 4.5$

$$\% 1^\circ = \frac{1^\circ \text{Hydrogen} \times 1}{1^\circ \text{H} \times 1 + 2^\circ \text{H} \times 3.8 + 3^\circ \text{H} \times 4.5} = \frac{6 \times 1}{6 \times 1 + 3.8} \times 100$$

$$\% 2^\circ = \frac{2 \times 3.8}{6 \times 1 + 2 \times 3.8} \times 100$$

Bromination →

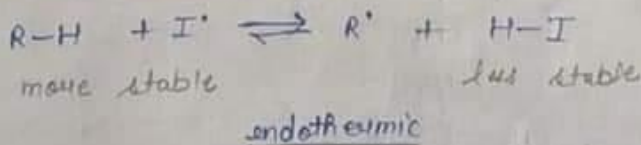
It is same as chlorination of alkanes.



exothermic F_2
 exothermic Cl_2
 exothermic Br_2
 endothermic I_2

Iodination →

It is an endothermic & reversible process.



reversible $\left\{ \begin{array}{l} \text{exothermic } F_2 \rightarrow 1^\circ > 2^\circ > 3^\circ \\ \text{" } Cl_2 \rightarrow \text{sometime selective sometime unreactive} \\ \text{" } Br_2 \rightarrow 3^\circ > 2^\circ > 1^\circ \end{array} \right.$
 irreversible, endothermic $I_2 \rightarrow 3^\circ > 2^\circ > 1^\circ$

