

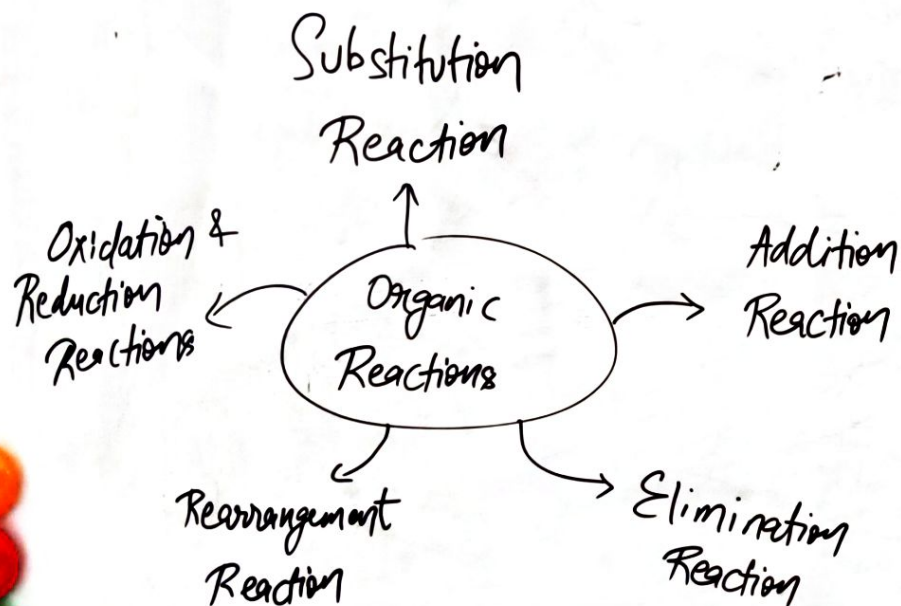
Organic Reaction Mechanism & DRUGS

It is a change in structure or functional group leading to formation of a new substance.

The compound undergoing a change in structure is called a reactant.

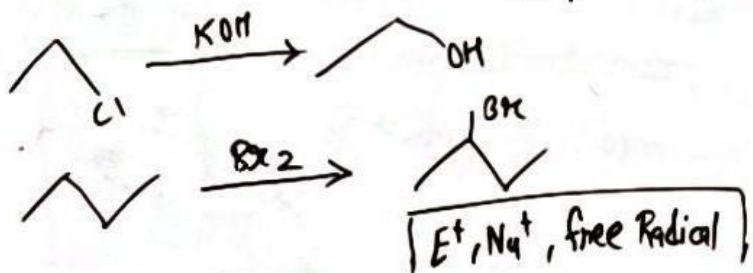
Drugs are a way of modifying the chemistry of body. They can be used to treat diseases & infections, correct imbalances in electrolytes & fluids.

A Perfect drug would be 100% effective while causing no side effects.



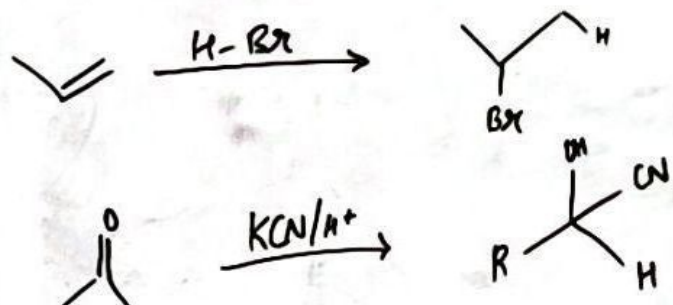
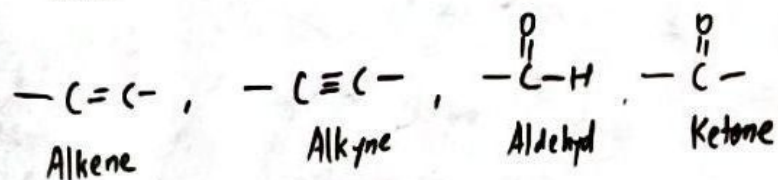
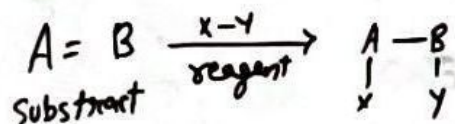
Substitution Reactions $\Rightarrow$

(Replacement)

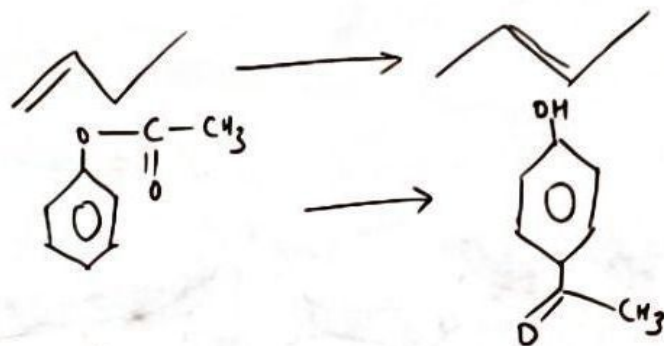


Addition Reactions

(At least one pi bond)

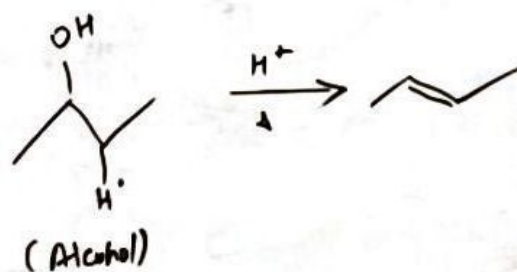
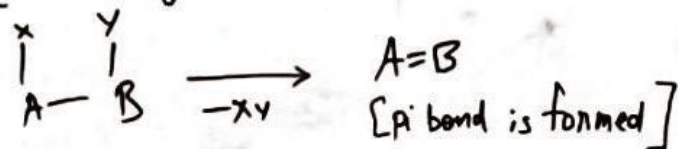


Rearrangement Reactions $\Rightarrow$ (Isomerisation)



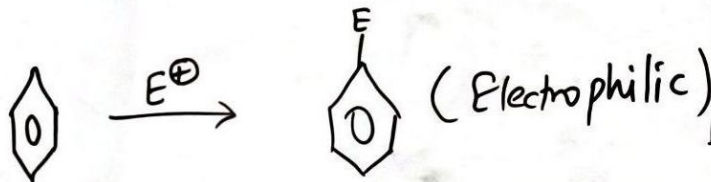
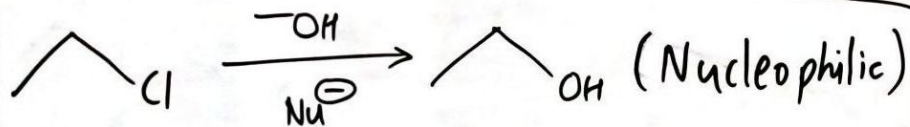
Elimination Reaction

(Reverse of addition Rxn)



Substitution Reactions $\Rightarrow$

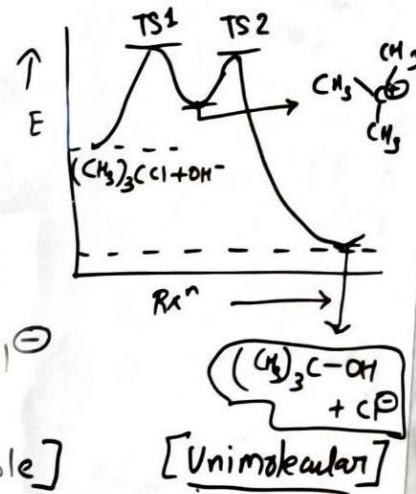
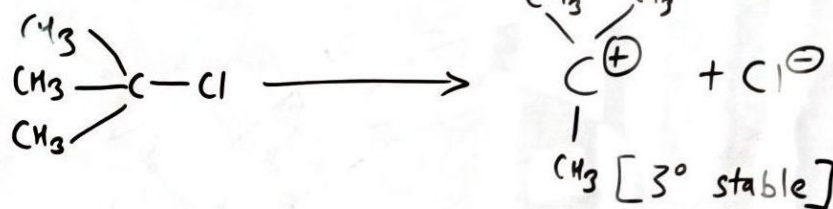
These reactions involve the displacement of an atom or a group by another atom or group.



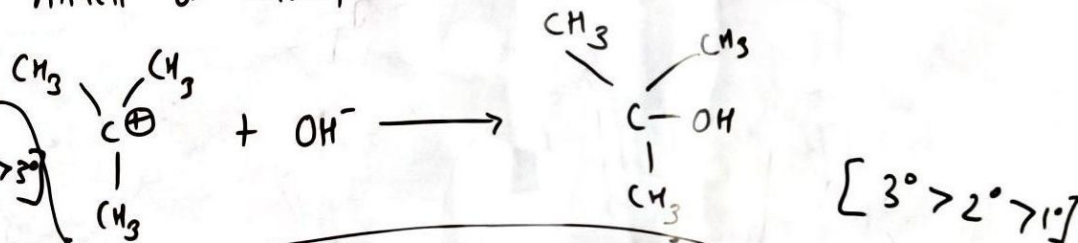
1. Nucleophilic Substitution Reaction :-

1. S_N1 :-

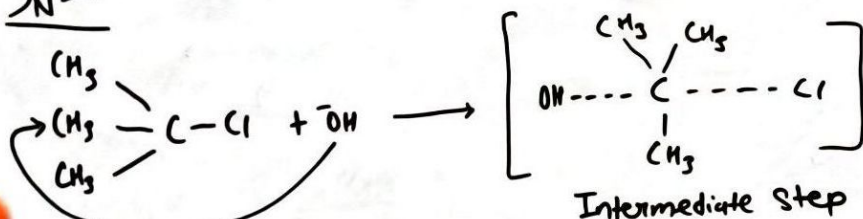
(a) Formation of $C^{\oplus} \Rightarrow$



(b) Attack of Nucleophile $\Rightarrow$

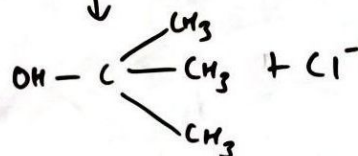


2. S_N2 :-

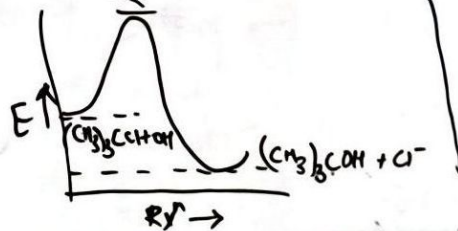
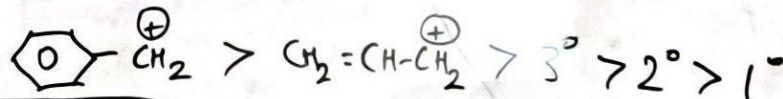


Steric Hindrance

Inversion of configuration



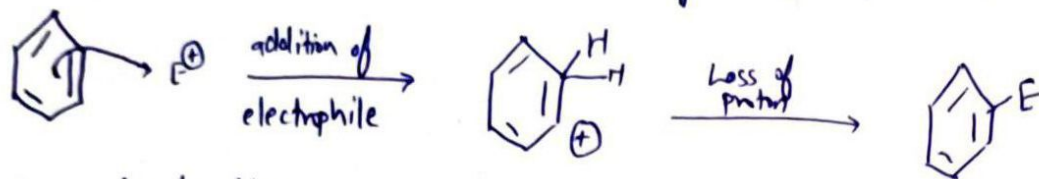
Stability of $C^{\oplus}$ / S_N1 :-



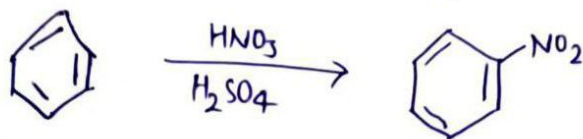
Electrophilic Substitution Reactions:- It involves substitution in the aromatic ring by an electrophile.

The electrophile is attacked by the π -electrons of the aromatic ring leading to the formation of a new carbenelectrophile bond. It is followed by loss of proton.

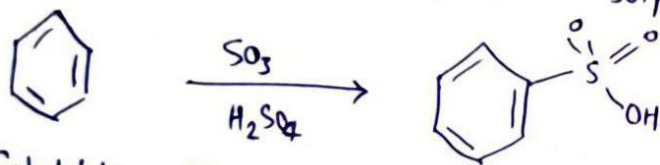
→ electrophile first attack to give an intermediate with positive charge, known as arenium ion & in second step leaving group departs. This is known as arenium ion mechanism.



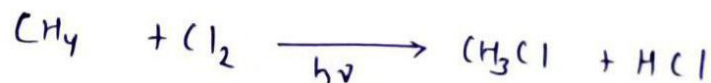
(a) Nitration:-



(b) Sulphonation:- In this reaction sulphur trioxide acts as electrophile



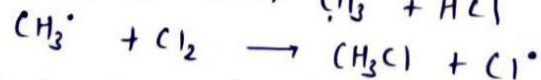
Free Radical Substitution Reactions:-



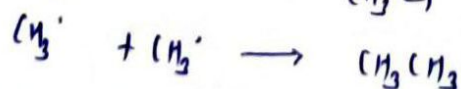
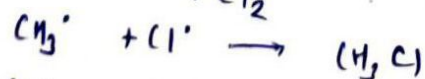
1st → Initiation ⇒ free radical formation by homolytic cleavage of bonds.



2nd → Chain Propagation ⇒ A molecule reacts with a free radical to generate a new radical.



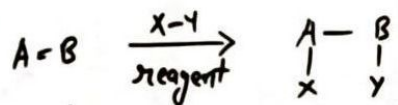
3rd → Chain Termination ⇒ (destruction of free radicals) This step involves a combination of two like or unlike radicals to form a new bond.



Addition Reaction $\Rightarrow$

[At least one pi bond]

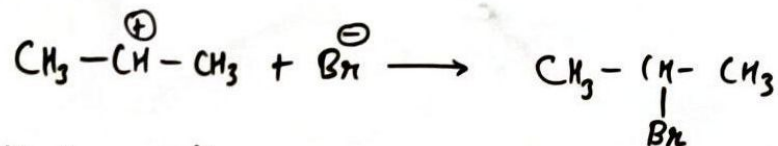
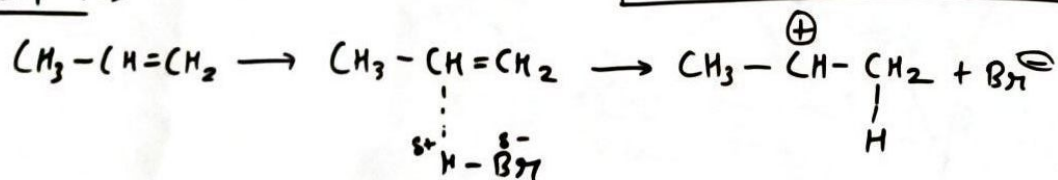
alkene [=], alkynes [$\equiv$], $C=O$, $C\equiv N$



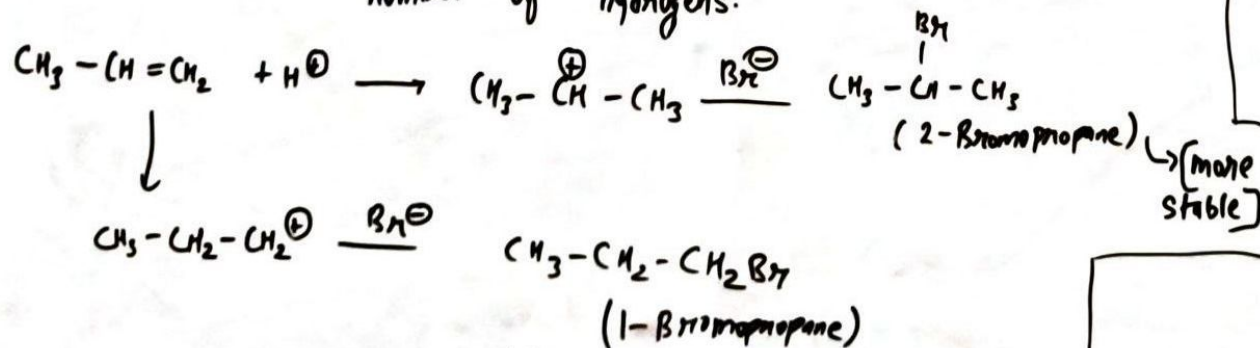
Subtract

(i) Electrophilic Addition R_x^+ :-

Step-1 $\Rightarrow$

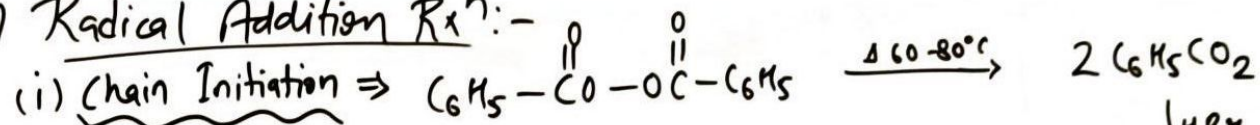


Markownikoff's Rule $\Rightarrow$ negative part of addendum is added to that doubly bonded carbon atom which bears the minimum number of hydrogens.

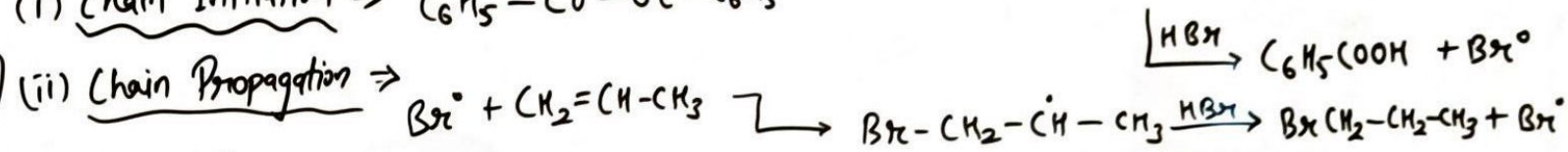


(ii) Radical Addition $R_x^\cdot$:-

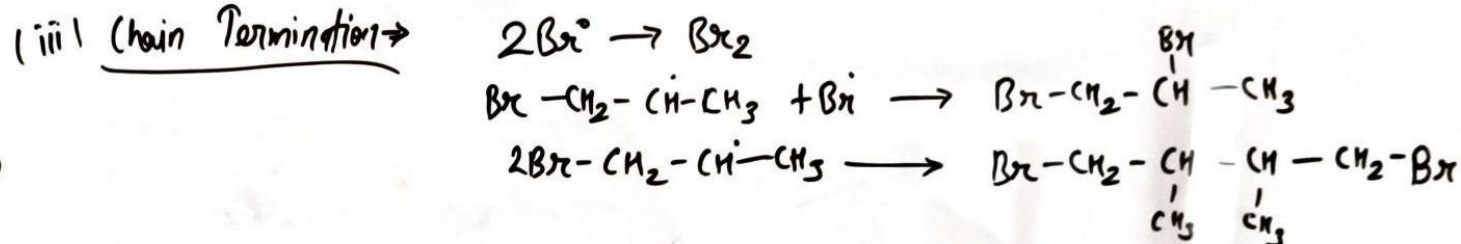
(i) Chain Initiation $\Rightarrow$



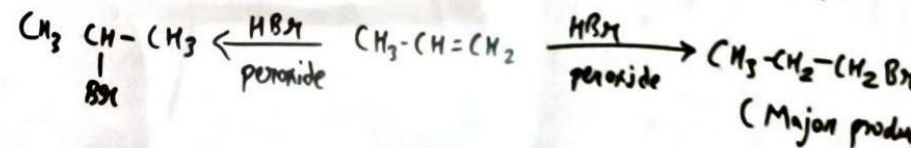
(ii) Chain Propagation $\Rightarrow$



(iii) Chain Termination $\Rightarrow$



Anti-Markownikoff's Addition or Peroxide Effect:-

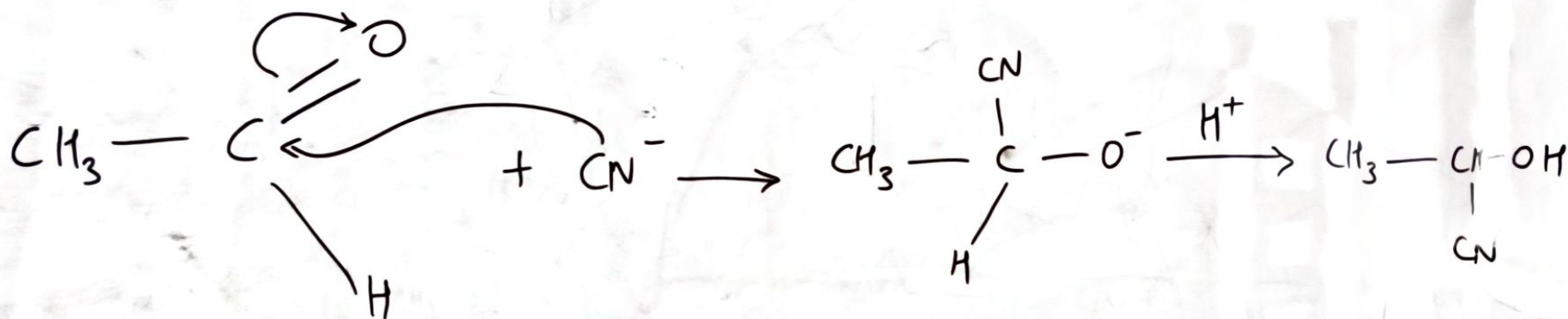
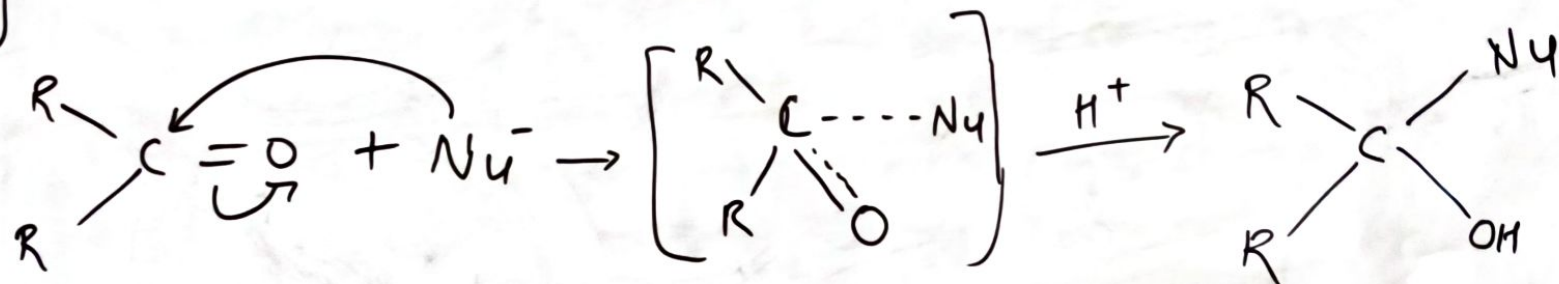
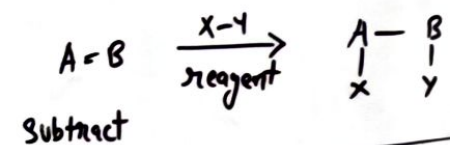


Because presence of peroxide the addition involves free Radical mechanism.

Addition Reaction $\Rightarrow$ (iii) Nucleophilic Addition $R_X^\ominus$: —

[At least one pi bond]

alkene [=], alkynes [$\equiv$], $C=O$, $C\equiv N$



Other Example —

addition of acids, alcohols to hemiacetals, addition of Grignard reagents,
addition of organozinc compounds etc.

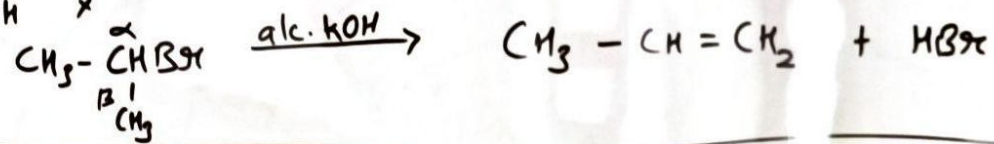
Elimination Reaction $\Rightarrow$ $\begin{array}{c} A - B \\ | \quad | \\ x \quad y \end{array} \longrightarrow A = B$ (loss of atoms or groups)

(reverse of addition Reaction)

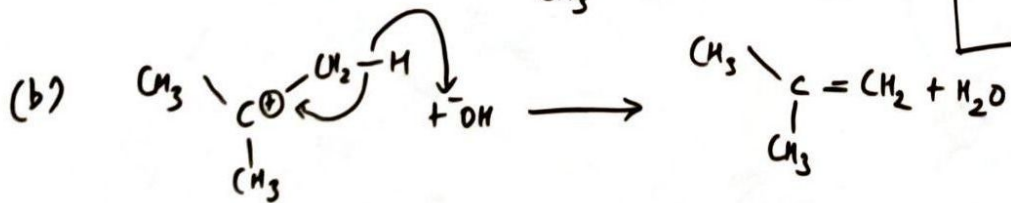
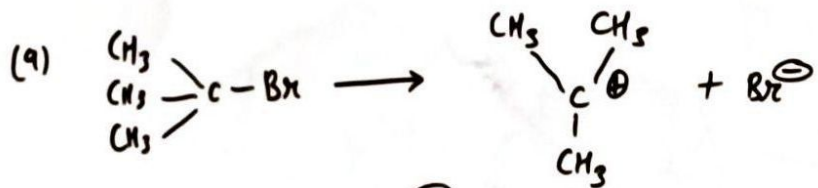
(reverse of addition reaction)
Types:- (i) α -Elimination $\Rightarrow$ It is very rare & involves elimination of two groups or atoms from same carbon
 $\text{CHCl}_3 \rightarrow \text{:CCl}_2 + \text{HCl}$

(ii) β -Elimination $\Rightarrow$ Removal of two atoms or groups from two adjacent carbon atoms of molecule

These reactions proceed via unimolecular (E_1) or bimolecular (E_2) mechanism.



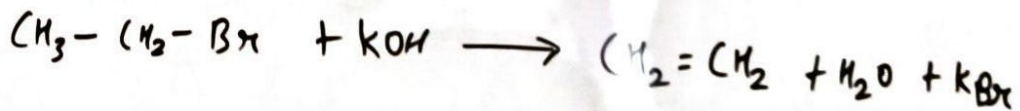
① $E_1 \rightarrow$ Dehydrohalogenation of T-alkyl halides
 $\rightarrow \text{Rate of Rxn} \propto [\text{Substrate}]^1_{\text{con.}}$



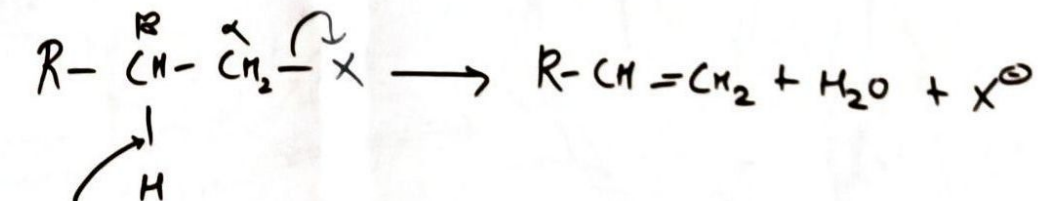
2 step
process

unimolecular

② $\boxed{F_2}$ Rate of Rxn $\propto [\text{Substrate}][\text{Reagent}]$



one step process



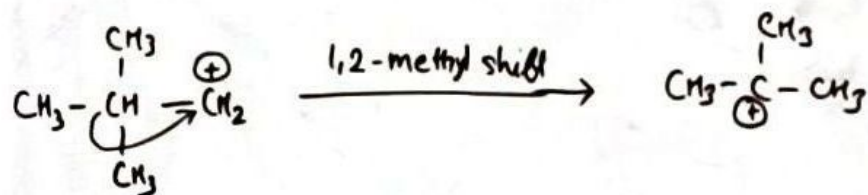
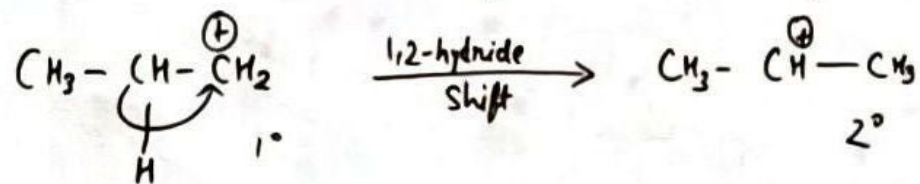
dehydrohalogenation reaction

⇒ abstraction of proton from β -carbon & the exclusion of leaving group. Bimolecular

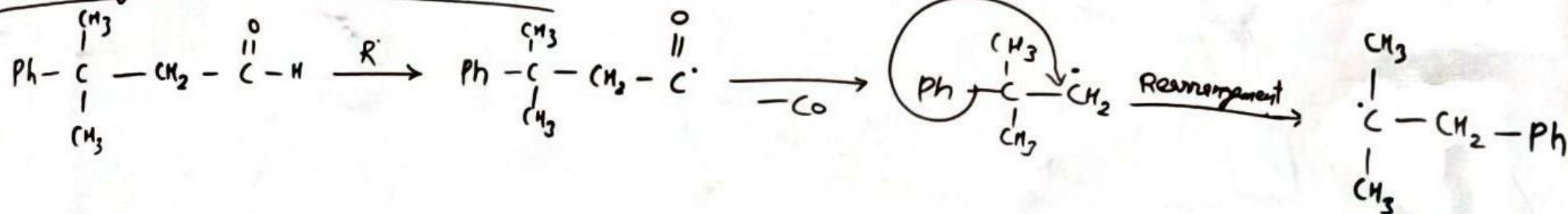
Biomolekuler

Rearrangement of Carbocation $\Rightarrow$ less stable (1° or 2°) carbocations are converted into more stable (2° or 3°) carbocations either by

1,2-hydride shift or by 1,2-methyl shift



Rearrangement of FREE Radical $\Rightarrow$



DRUGS

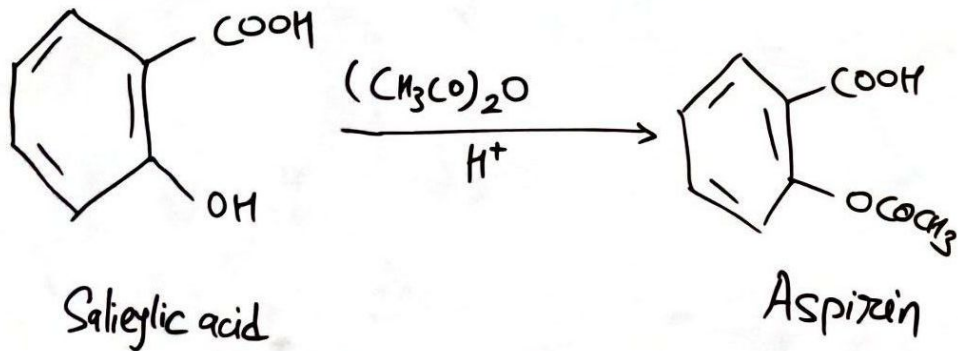
1. Aspirin $\Rightarrow$ Used for treatment of pain & fever due to various causes.

$\rightarrow$ Acetylsalicylic acid has both anti-inflammatory & antipyretic effects.

$\rightarrow$ It is used in prevention of blood clots stroke & myocardial infarction.

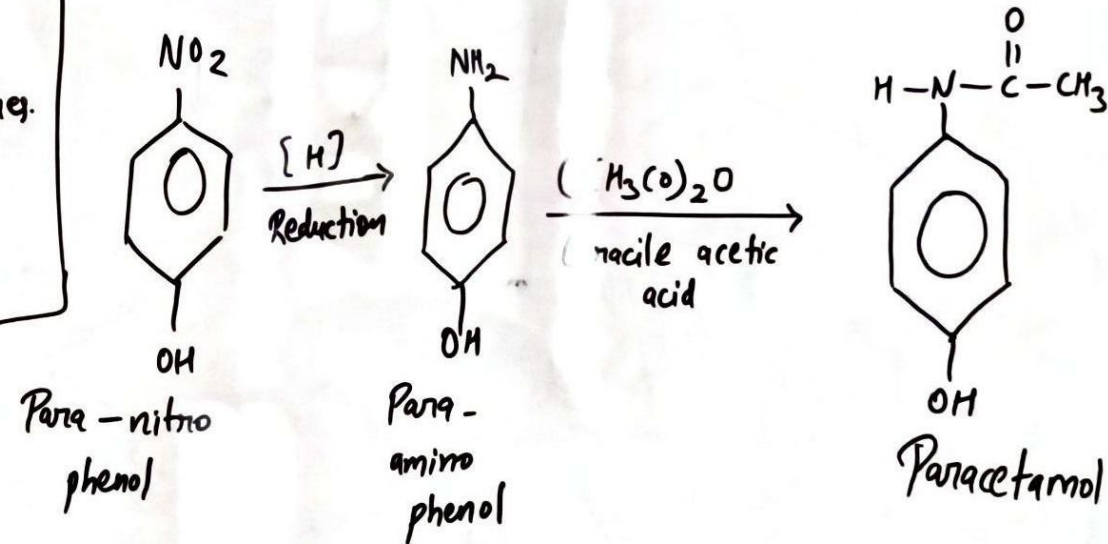
$\rightarrow$ It is used in treatment of different types of headaches.

Synthesis :-



- $\rightarrow$ Way of modifying the chemistry of body.
- $\rightarrow$ Can be used to treat diseases & infections, correct imbalances in electrolytes & fluids.
- $\rightarrow$ Used for both in medical purposes & for recreation.
- $\rightarrow$ A perfect drug would be 100% effective while causing no side effects.

2. Paracetamol : $\Rightarrow$ Used to treat pain & fever.
(Acetaminophen) • Used for mild to moderate pain relief.



$\rightarrow$ Paracetamol exists as white crystalline powder, sparingly soluble in water, soluble in alcohol & very slightly soluble in methylene chloride.