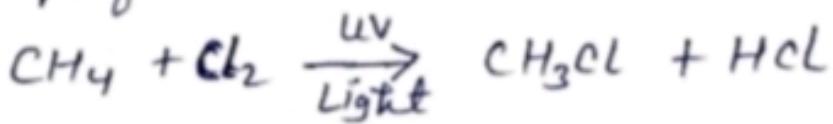
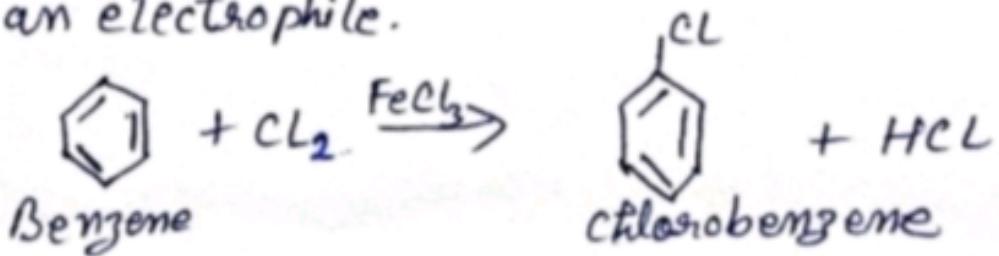


(3) Substitution Reaction → In this reaction atom or group of atom directly attached to carbon in substrate molecule is replaced by another atom or group of atoms.

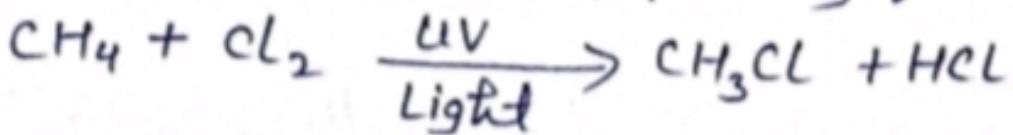


(a) Electrophilic Substitution → In this reaction substitution takes place by attack of an electrophile.



Scanned with ACE Scanner

(b) Free Radical Substitution Reaction → In this reaction substitution takes place by free Radical.



(c) Nucleophilic Substitution Reaction → In this reaction substitution takes place by an attack of Nucleophile.

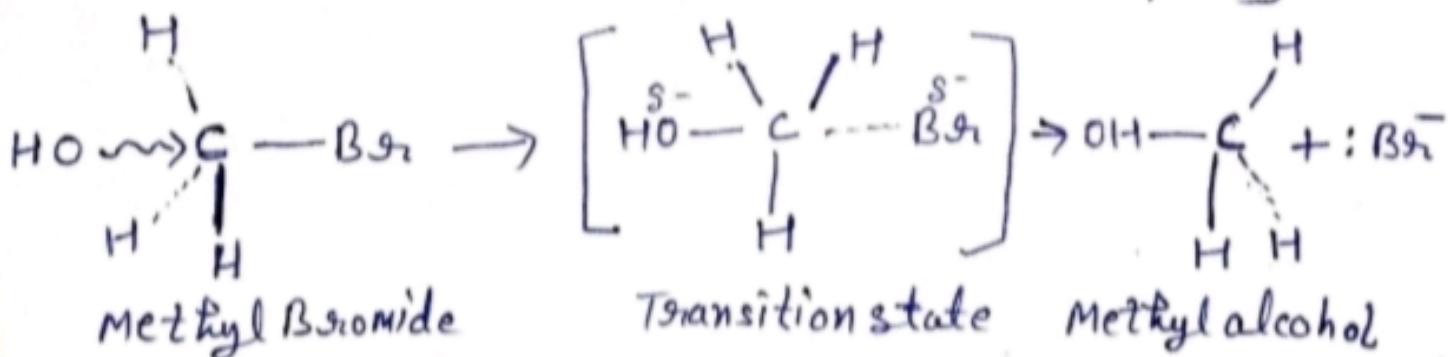
Nucleophilic Substitution take place by two mechanism

(a) $\text{S}N^2$ [Bimolecular] (b) $\text{S}N^1$ [unimolecular]

S_N^2 [Bimolecular Nucleophilic Substitution Reaction]

In this reaction of nucleophilic substitution reaction depend on substrate and Nucleophile

Rate \propto [substrate] [Nucleophile]

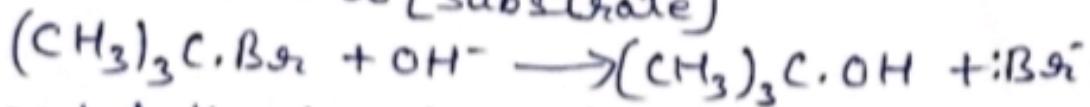


Hydroxide ion attack substrate carbon from the side opposite the bromine atom. In transition state OH and Br^- are partially bonded to carbon atom of substrate. $\text{C}-\text{Br}$ bond is not completely break and $\text{C}-\text{OH}$ bond is not completely formed. Energy require to break $\text{C}-\text{Br}$ bond is partially provided by energy liberated by formation of $\text{C}-\text{OH}$ bond. In final product configuration of C is inverted.

Like umbrella blown inside out. This change is known as Walden Inversion,

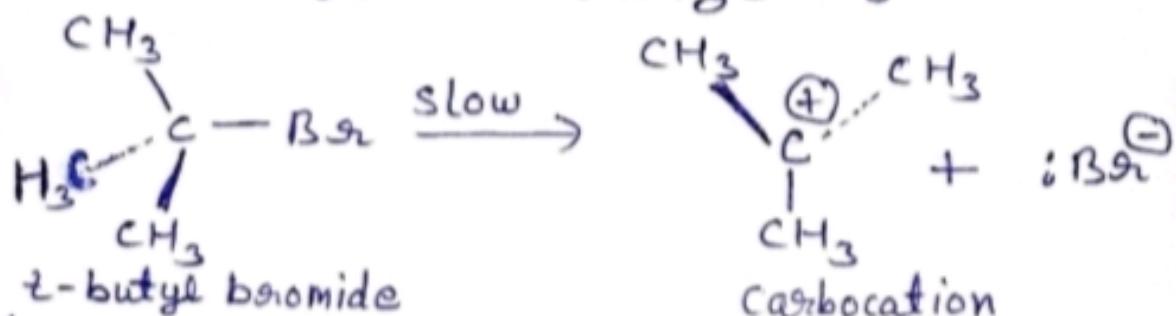
S_N^1 Mechanism → In this nucleophilic Substitution reaction depend on the concentration of the substrate.

Rate \propto [substrate]



SN's take place in 2 steps

Ist step \rightarrow t -Butyl Bromide ionize to give carbocation



IInd step → In 2 step nucleophile can attack the carbocation from either side to give *2*-butyl alcohol.
 If starting material is optically active then carbocation will form equal amount of isomer [one with retention and other with inversion of configuration]

