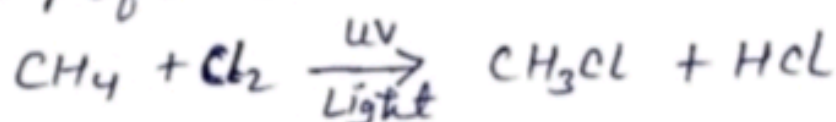
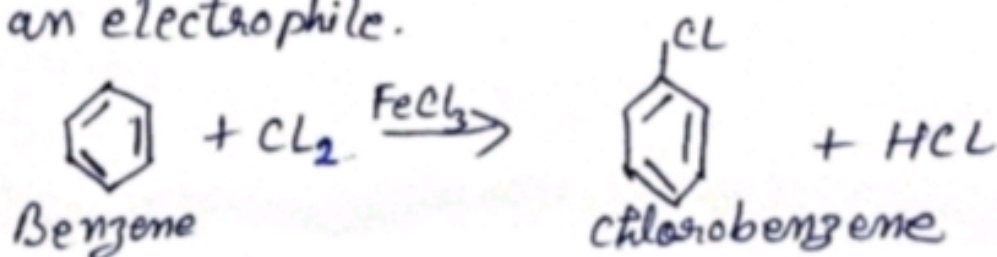


(3) Substitution Reaction → In this reaction atom or group of atom directly attached to carbon in substrate molecule is replaced by another atom or group of atoms.

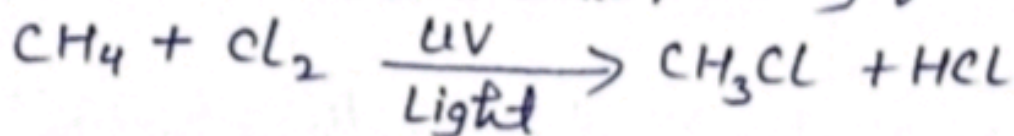


(a) Electrophilic Substitution → In this reaction substitution takes place by attack of an electrophile.



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(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.

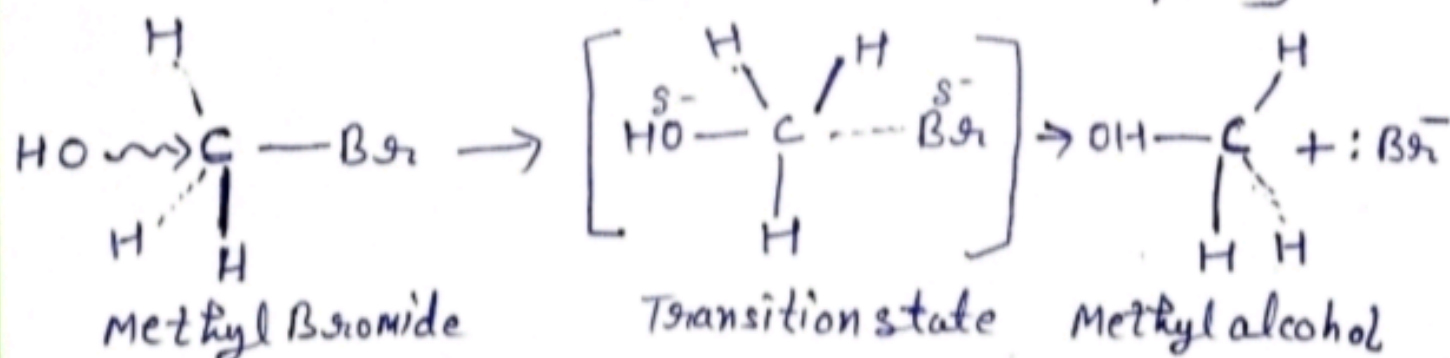
Nucleophilic Substitution take place by two mechanisms

(a) S_N² [Bimolecular] (b) S_N¹ [unimolecular]

S_N2 [Bimolecular Nucleophilic Substitution Reaction]

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

$$\text{Rate} \propto [\text{Substrate}][\text{Nucleophile}]$$



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.

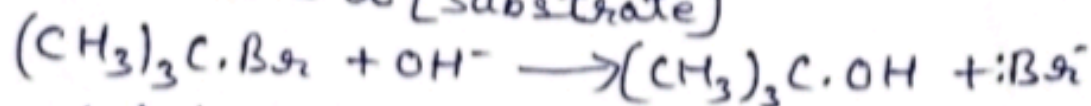
C-Br bond is not completely break and C-OH bond is not completely formed. Energy require to break C-Br bond is partially provided by energy liberated by formation of C-OH bond. In final product configuration of C is inverted.

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

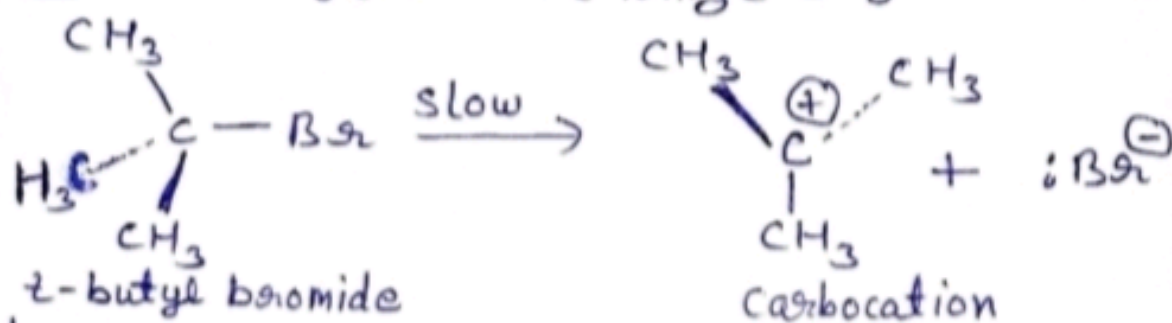
SN' Mechanism \rightarrow In this nucleophilic Substitution reaction depend on the Concentration of the Substrate.

Rate \propto [Substrate]



SN' take place in 2 steps

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



IInd step \rightarrow In 2 step nucleophile can attack the carbocation from either side to give *t*-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]

