

## ⇒ Alpha Alkylation:-

An R group is introduced on  $\alpha$ -position and C-C bond is formed and it is called  $\alpha$ -Alkylation.

Mechanism: Enolate react with alkyl halide with  $\delta^+$  alkyl group and leaving group leaves the system. Thus these are  $S_N2$  reactions and can be favoured by following factors:

- (1) substrate

(1) primary alkyl halide gives this reaction  
 $CH_3-X$ ,  $CH_3CH_2-X$

Secondary alkyl halides give moderate reaction

3° alkyl halides not give this reaction.

Benzylic and Allylic alkyl halide give both  $S_N1$  and  $S_N2$  reactions why?

"The presence of  $\pi$  system adjacent to the  $R-X$  carbon increase the rate of  $S_N2$  reaction by stabilizing the transition state and likewise increase the rate of  $S_N1$  reaction."

The effect on  $S_N2$  reaction applies to both  $C=C$  (electron rich) and  $C=O$  (electron deficient)

$\pi$  systems, but only  $C=C$   $\pi$  system increase the rate of  $S_N1$  reaction.

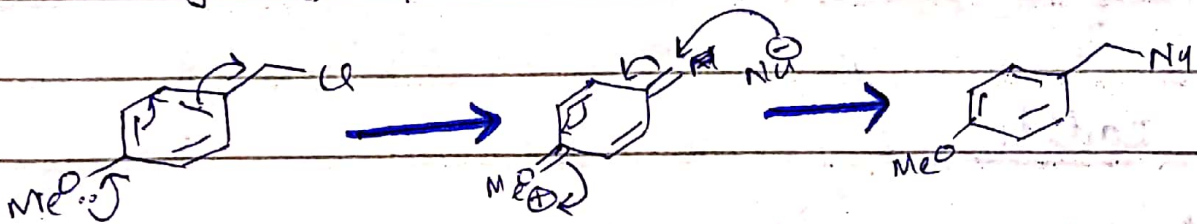
Adjacent  $C=O$  groups in fact decrease the reactivity of alkyl halides towards  $S_N1$  reaction because EW effect of carbonyl destabilize the carbocation.

⇒ Benzylic and allylic compounds undergo both  $S_N1$  and  $S_N2$  reaction by change in solvent and group attached to them either EDG or EWG.

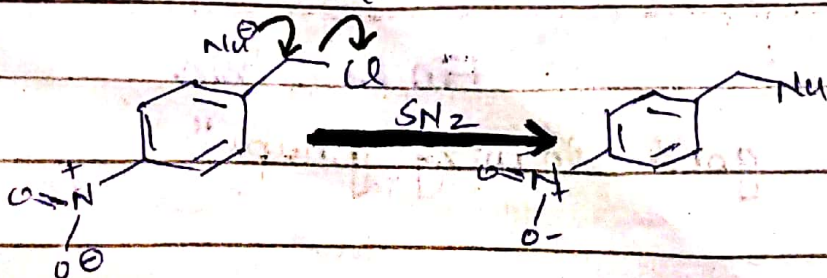
if **EWG** destabilize the carbocation.

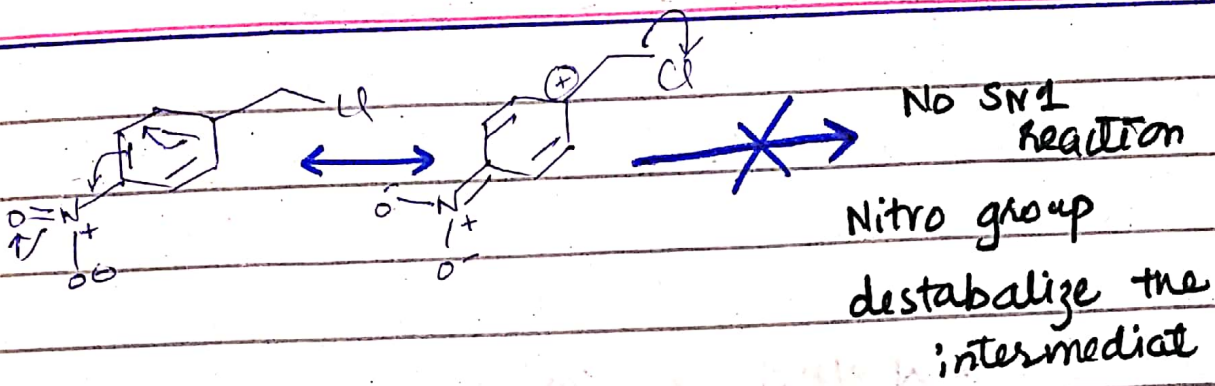
**EDG** stabilize the carbocation.

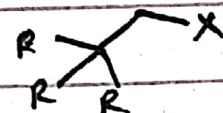
⇒ 4-methoxy benzyl chloride undergoes  $S_N1$  reaction due to stabilizing effect of methyl group.

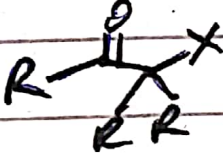


⇒ Electron withdrawing group such as nitro group destabilize the carbocation and it does not undergo  $S_N1$ , rather it goes to  $S_N2$  reaction.





"Neopentyl"  not undergoes SN1 and SN2 reactions easily.

 Not undergoes SN1 but SN2 may be possible.

$\alpha$ -carbonyl and tertiary

## 2- Leaving Group

Good leaving group is needed.  $X^-$  must be good  $e^-$  accommodator in halogens

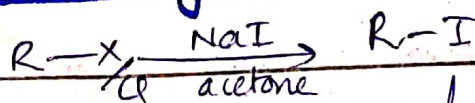
Good  $\leftarrow I > Br > Cl \rightarrow$  commonly used because least reactive.  
LiG but most expensive

Iodide  $\rightarrow$  Good electron accommodator due to 3

o- high polarizability

o- large size have large size / surface for charge accommodation.

## Halogen Exchanges-

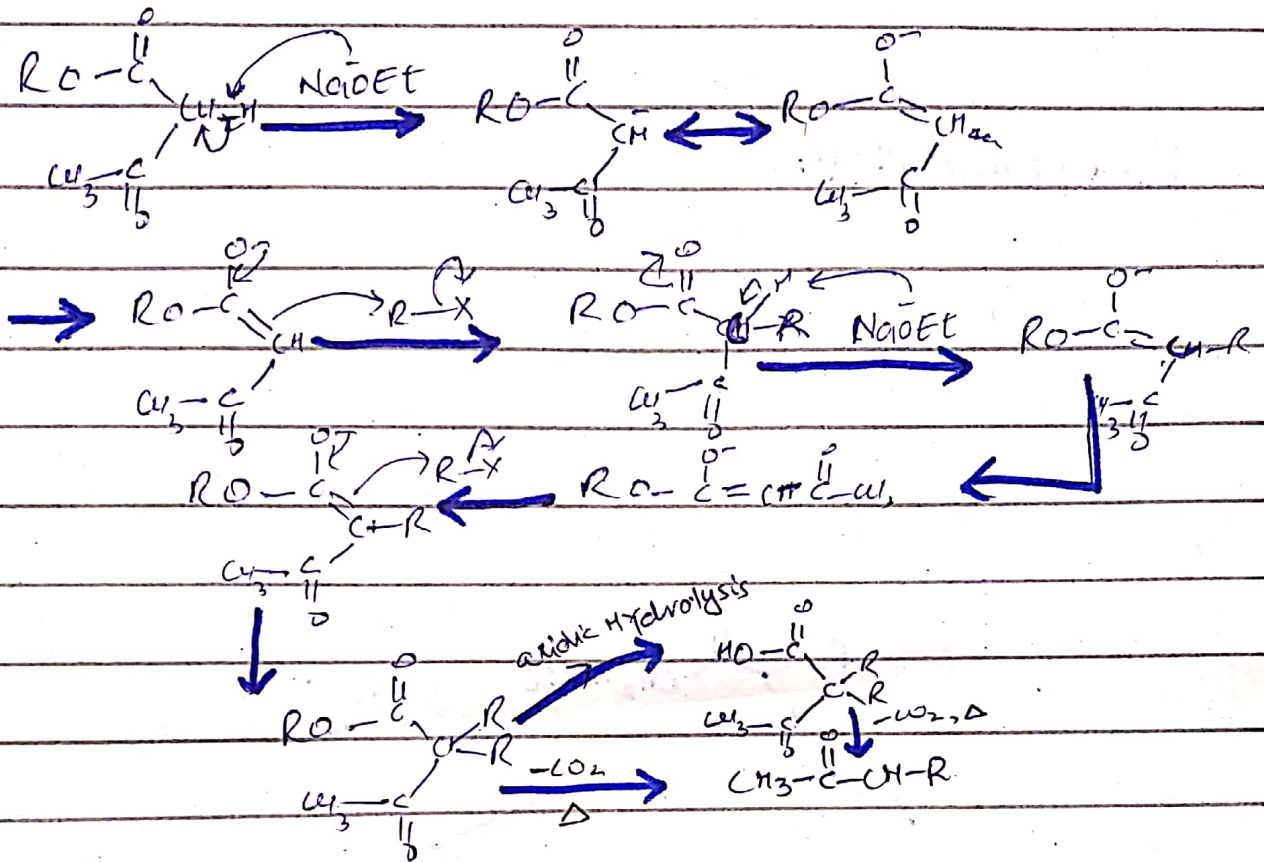


This reaction is called **Finkelstein**

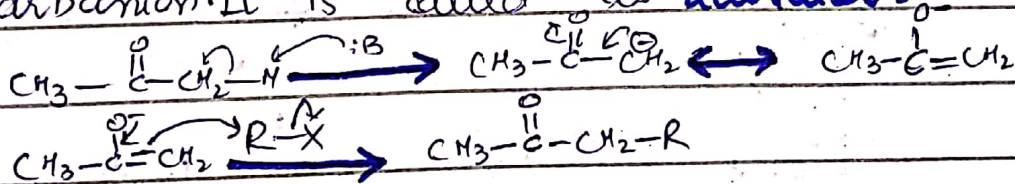
"OTs are good leaving groups"

# " $\alpha$ -Alkylation $\Rightarrow$ Continuous process"

$\alpha$ -Alkylation Repeats until all the Hydrogens are deprotonated.



Activator: Ester increase the stability of carbanion. It is called as **activator**.



Using ester product is similar to this reaction but it increases the life of carbanion.

ester can be easily removed by decarboxylation and hydrolysis.

**Carboxylic acid** in addition to ester can

be used but rarely it is used because

The proton of COOH group is more acidic than  $\text{CH}_3\text{OH}$ . Thus this is not mostly used used in harsh conditions.