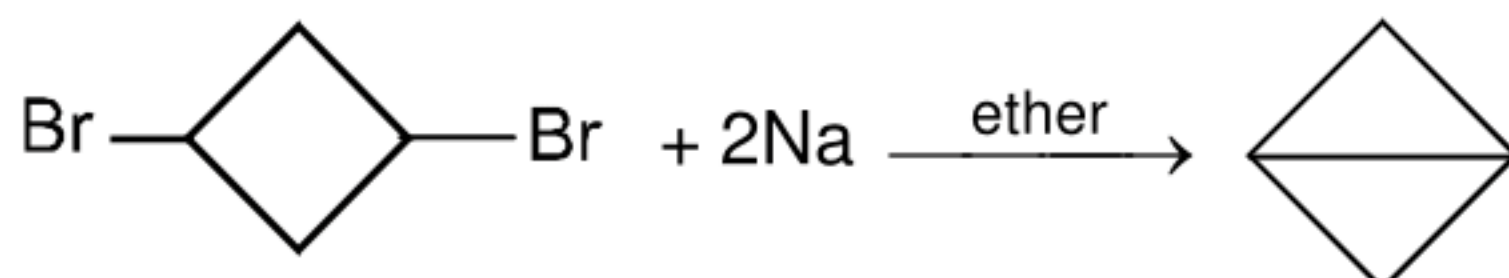
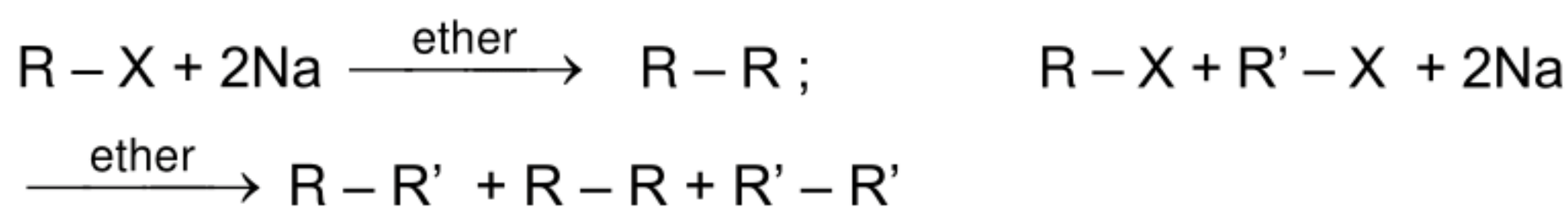


Alkane

Wurtz reaction (Reagent : Na, ether) 1° & 2° alkyl halides give this reaction.

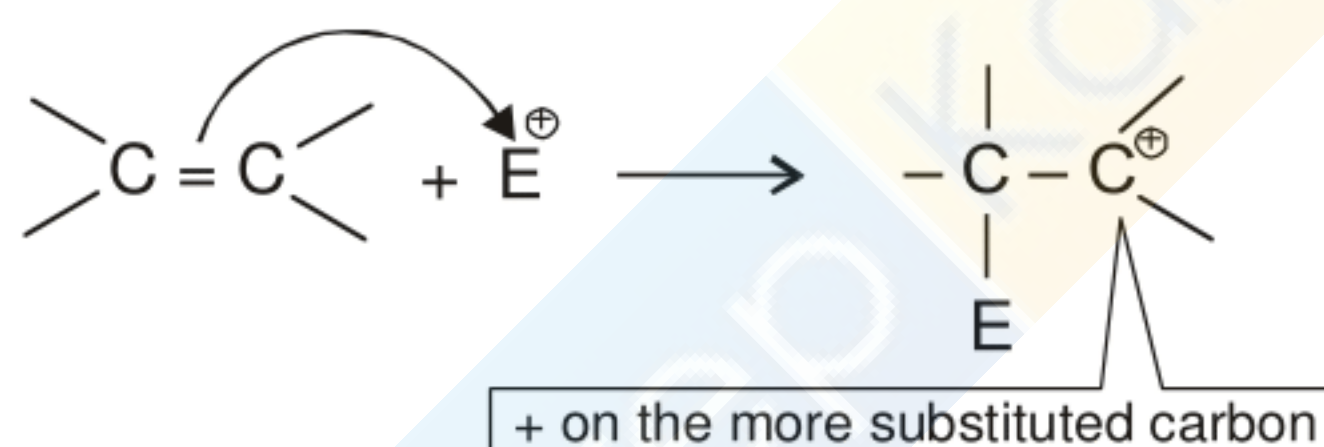


Alkene & Alkyne

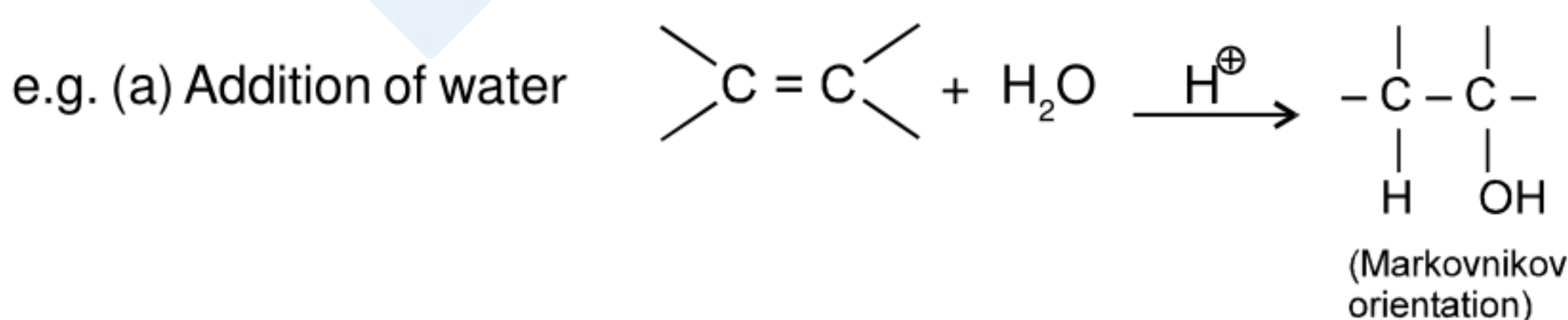
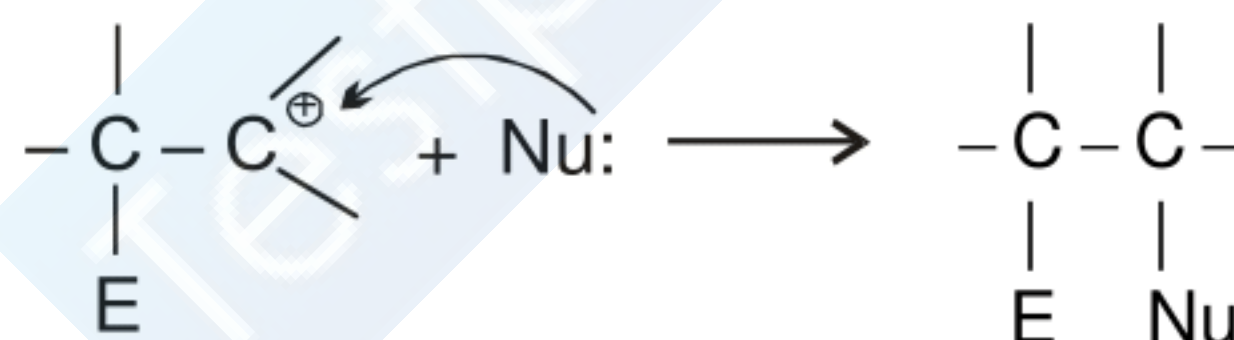
Characteristic reaction of Alkene & Alkyne is Electrophilic addition reaction.

Mechanism

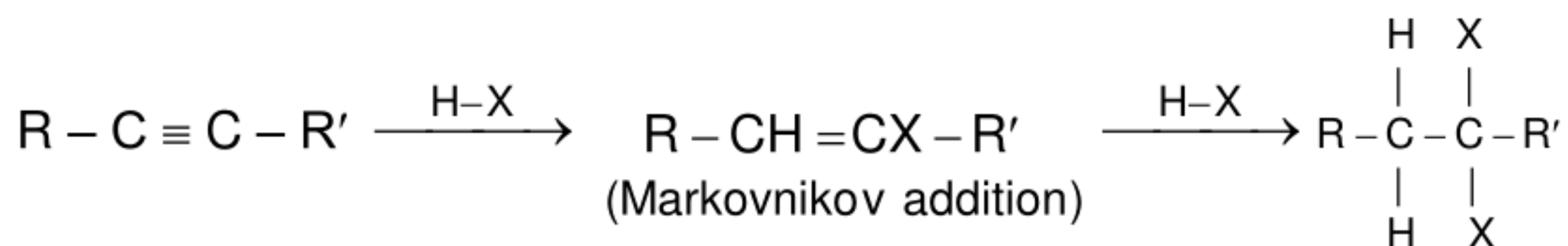
Step 1 : Attack of the electrophile on π bond forms a carbocation.



Step 2 : Attack by a nucleophile gives the product of addition.



(b) Addition of hydrogen halides (where HX = HCl, HBr, HI)



Note: When electrophiles are: Cl⁺, Br⁺, I⁺, NO₂⁺ or Hg²⁺ then stereochemistry is important and major product is formed by anti addition.

Alkyl halide

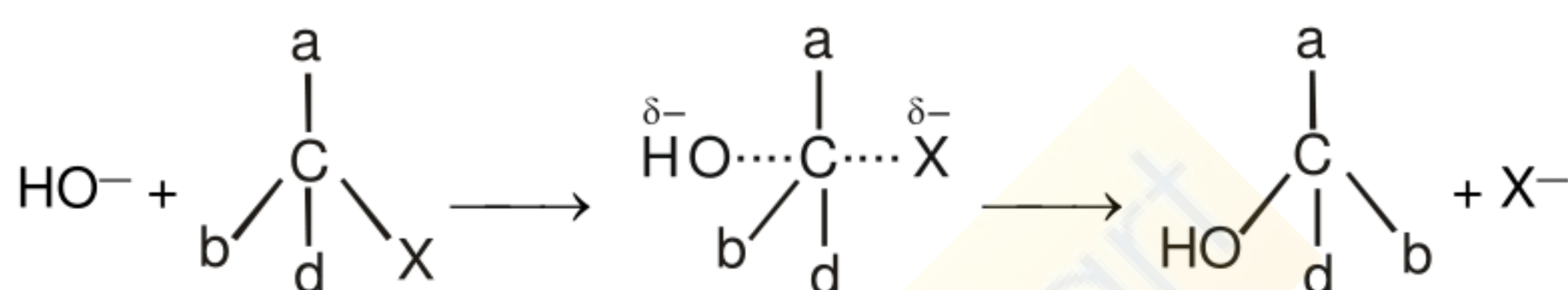
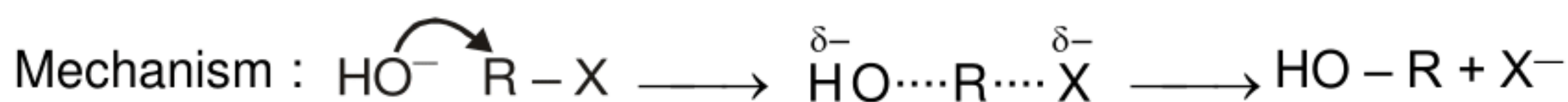
Nucleophilic substitution Reaction (S_N1 , S_N2)

S_N1 reaction :



Alkylhalide are hydrolysed to alcohol very slowly by water, but rapidly by silver oxide suspended in boiling water.

S_N2 reaction :



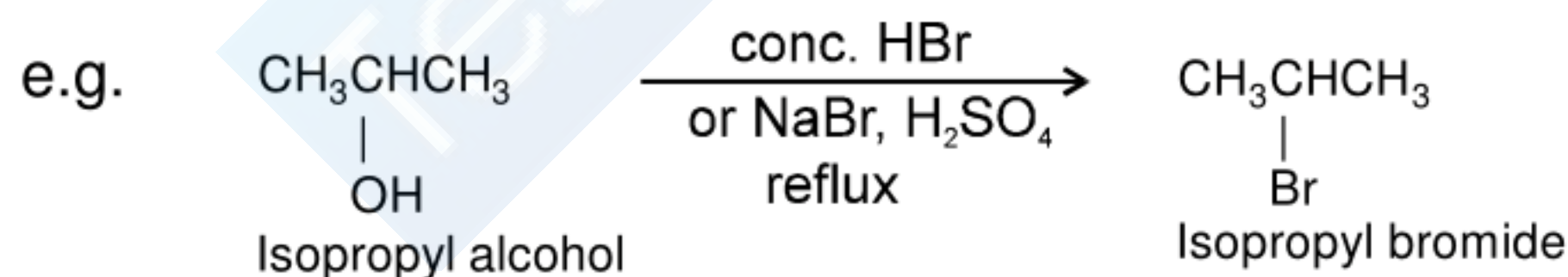
Alcohol

S_N1 reaction :

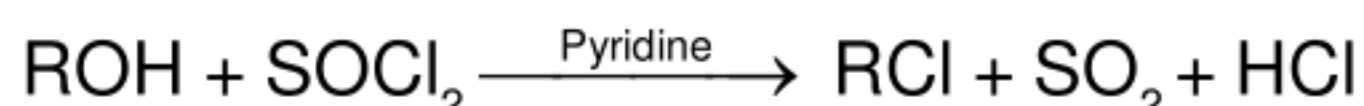


Reactivity of HX : $HI > HBr > HCl$

Reactivity of ROH : allyl, benzyl $> 3^\circ > 2^\circ > 1^\circ$ (Carboocation)

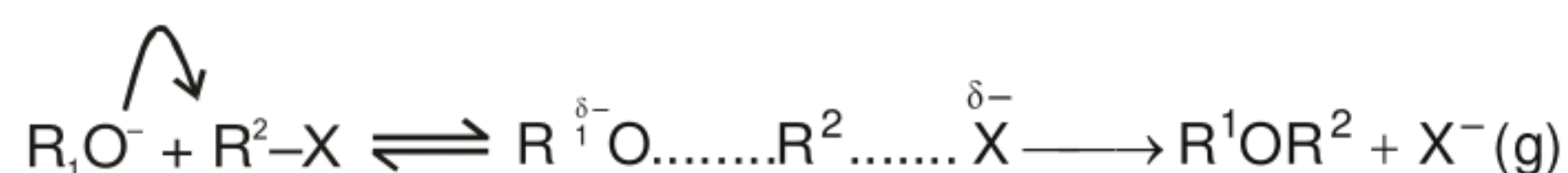


S_N2 reaction :



Williamson's synthesis :

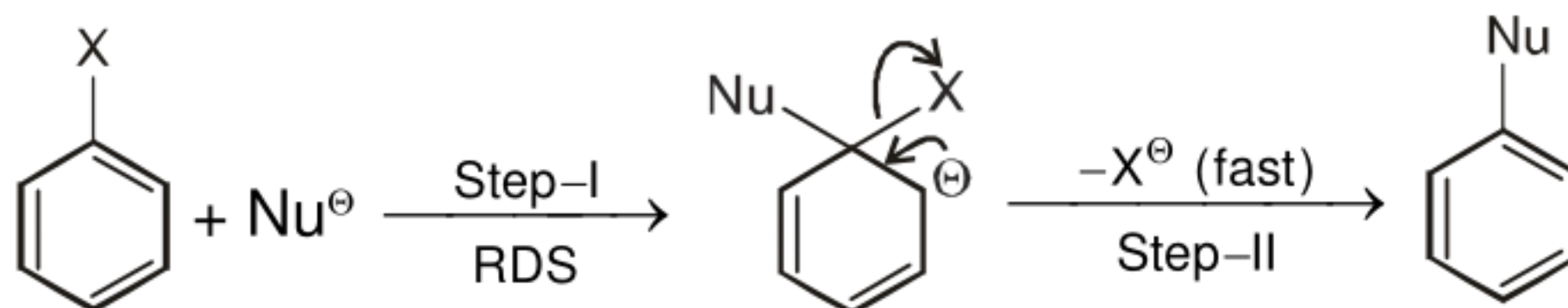
It is the reaction in which sodium or potassium alkoxide is heated with an alkyl halide (S_N2).



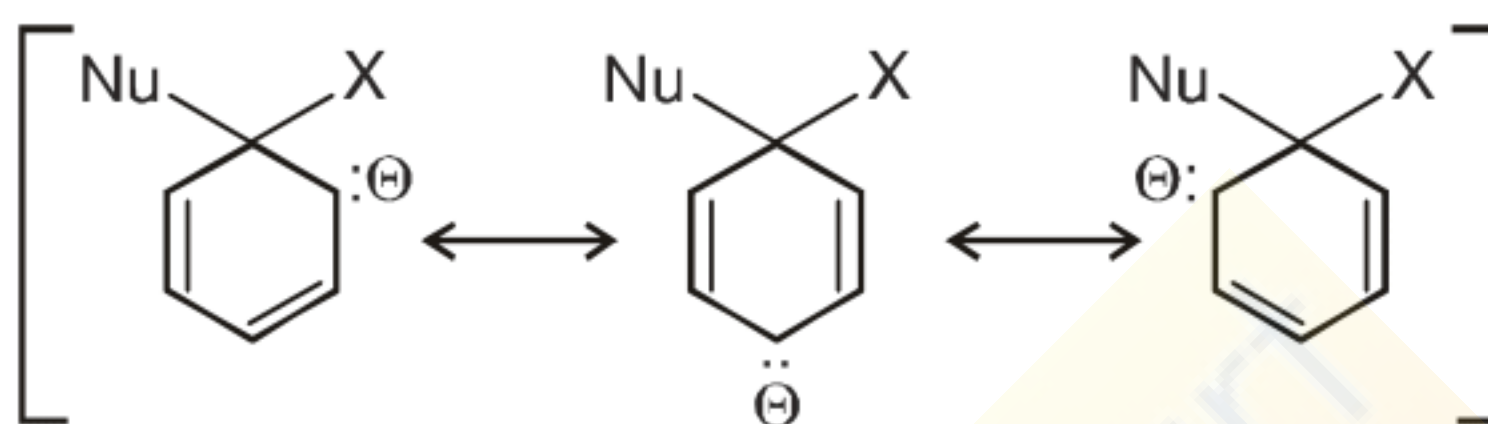
This method is particularly useful for preparing mixed ethers.

Nucleophilic Aromatic Substitution of aryl halides(S_N2Ar):

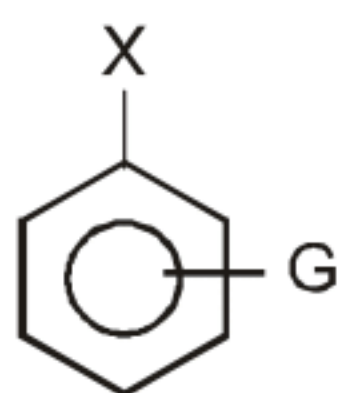
- An electron withdrawing group at ortho or para positions with respect to a good leaving groups are necessary conditions for S_N2Ar .



Intermediate ion is stabilized by resonance. and are stable salts called Meisenheimer salts.



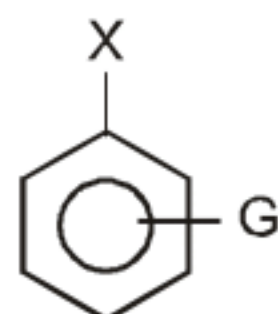
- A group that withdraws electrons tends to neutralize the negative charge of the ring and this dispersal of the charge stabilizes the carbanion.



G withdraws electrons : stabilizes carbanion, activates the $Ar-S_N2$ reaction.

($-\overset{+}{N}(CH_3)_3$, $-\text{NO}_2$, $-\text{CN}$, $-\text{SO}_3\text{H}$, $-\text{COOH}$, $-\text{CHO}$, $-\text{COR}$, $-\text{X}$)

- A group that releases electrons tends to intensify the negative charge, destabilizes the carbanion, and thus slows down reaction.



G ($-\text{NH}_2$, $-\text{OH}$, $-\text{OR}$, $-\text{R}$) releases electrons : destabilizes carbanion, deactivates the $Ar-S_N2$ reaction.

Element effect :

Reactivity order towards S_N2Ar with different halogens
 $Ar-F > Ar-Cl > Ar-Br > Ar-I$