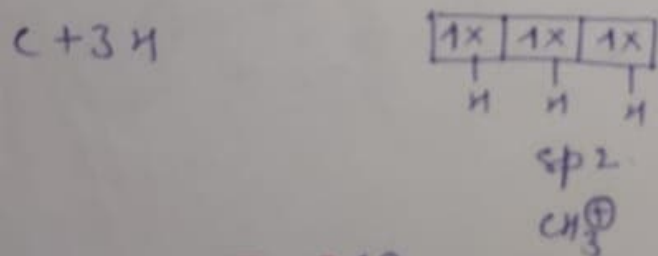
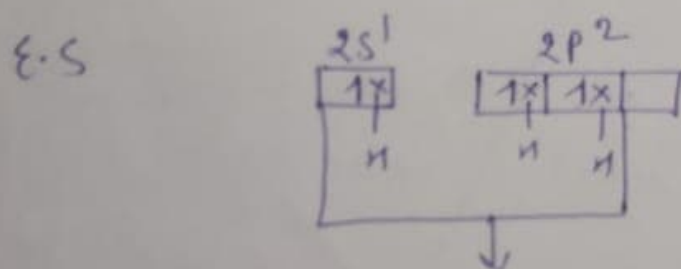
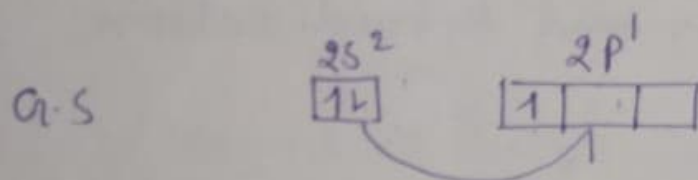
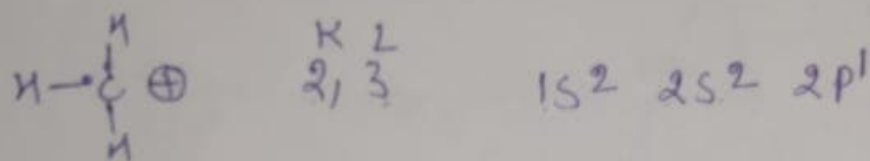


Carbocations The carbon species containing positive charge, are called carbocations.

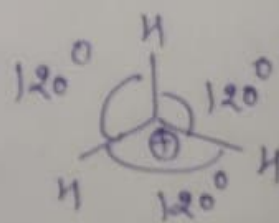
The carbocations are intermediates and have six electrons in the octet.



I 248

II. 209

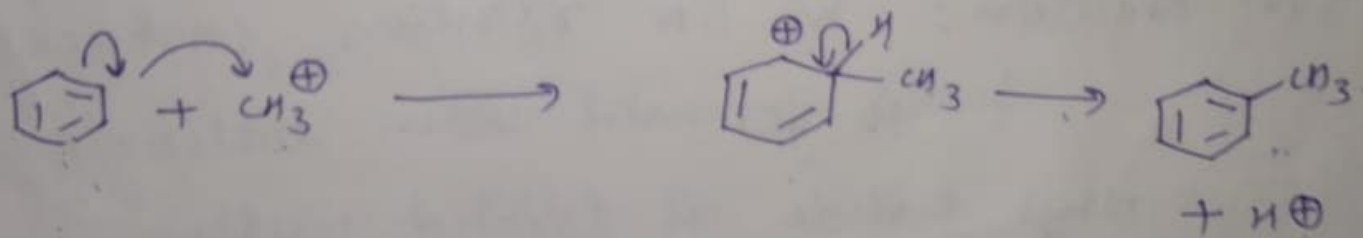
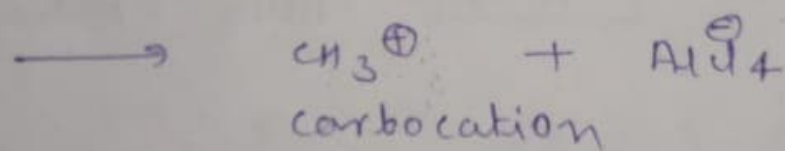
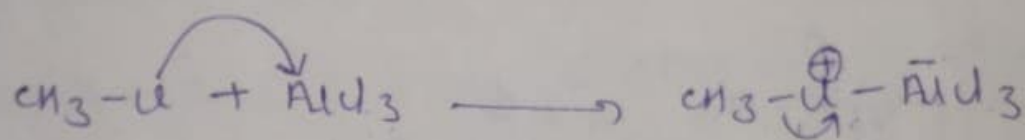
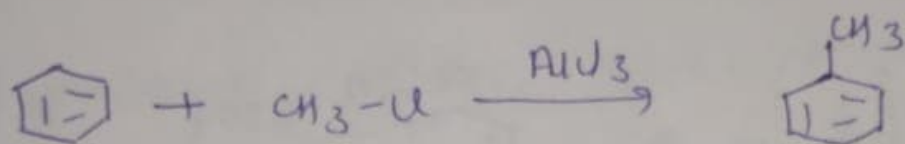
Shape



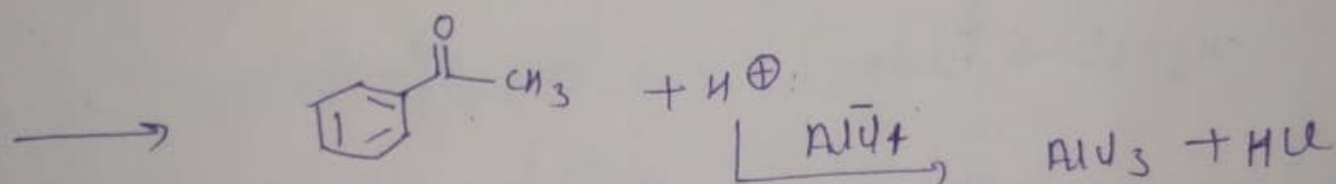
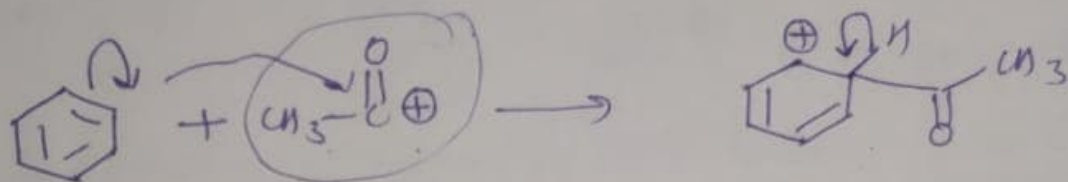
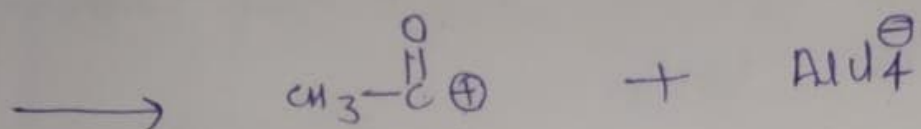
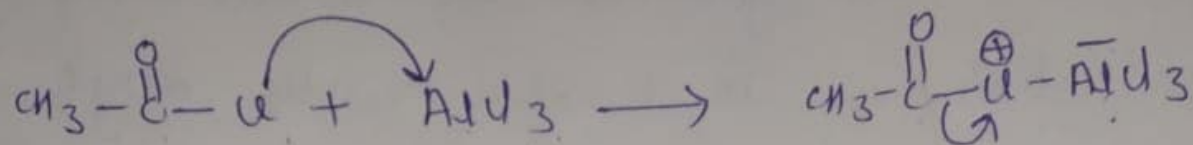
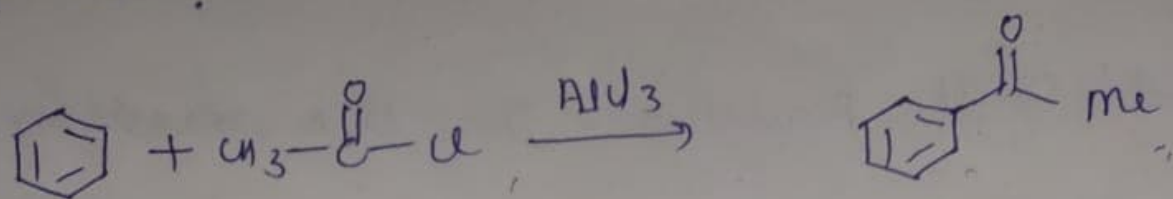
Trigonal planar

Formation of carbocation:

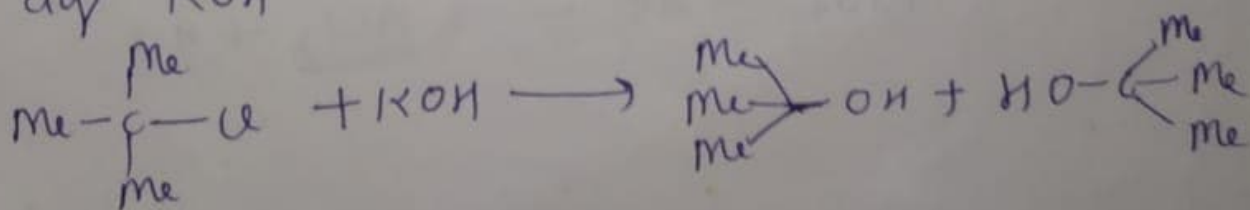
- 1) Friedel Craft Reaction: In this reaction, carbocation is formed as intermediate when benzene is treated with alkyl halide or aryl halide in presence of Lewis acid like $AlCl_3$.



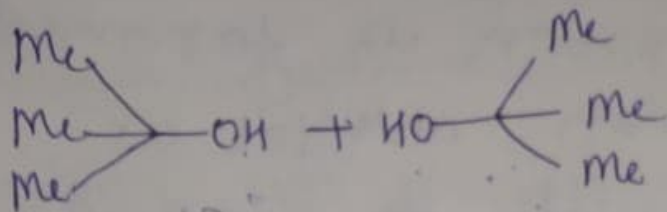
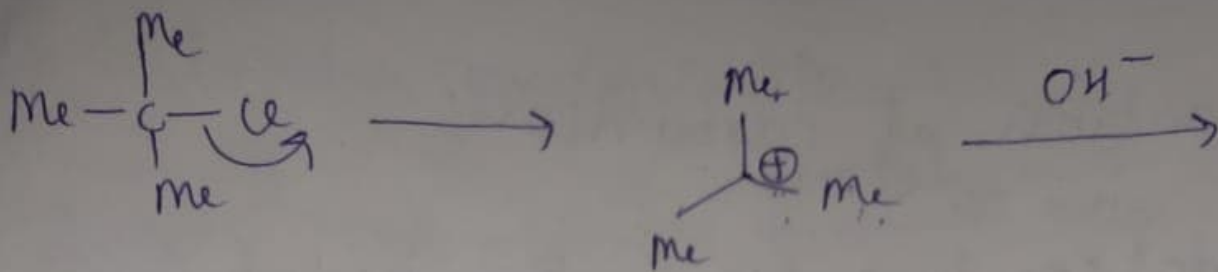
Acylation:



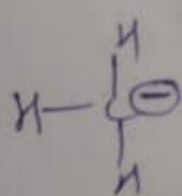
S_N1 Reaction: In S_N1 reaction, carbocation is formed when tertiary alkyl halide is treated with aq KOH



(3)



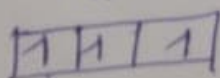
Carbanions: carbon species containing net negative charge are called carbanions. The carbanions are intermediates and have $8e^-$ in the orbit.



K.L
2 5

$1s^2 2s^2 2p^3$

$2p^3$



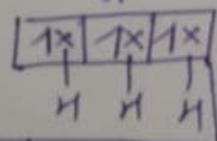
Shape

G.S

$2s^2$

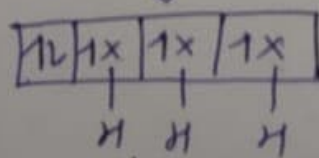
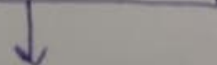


$2p^3$



E.S

$2s^2$



$C+3H$

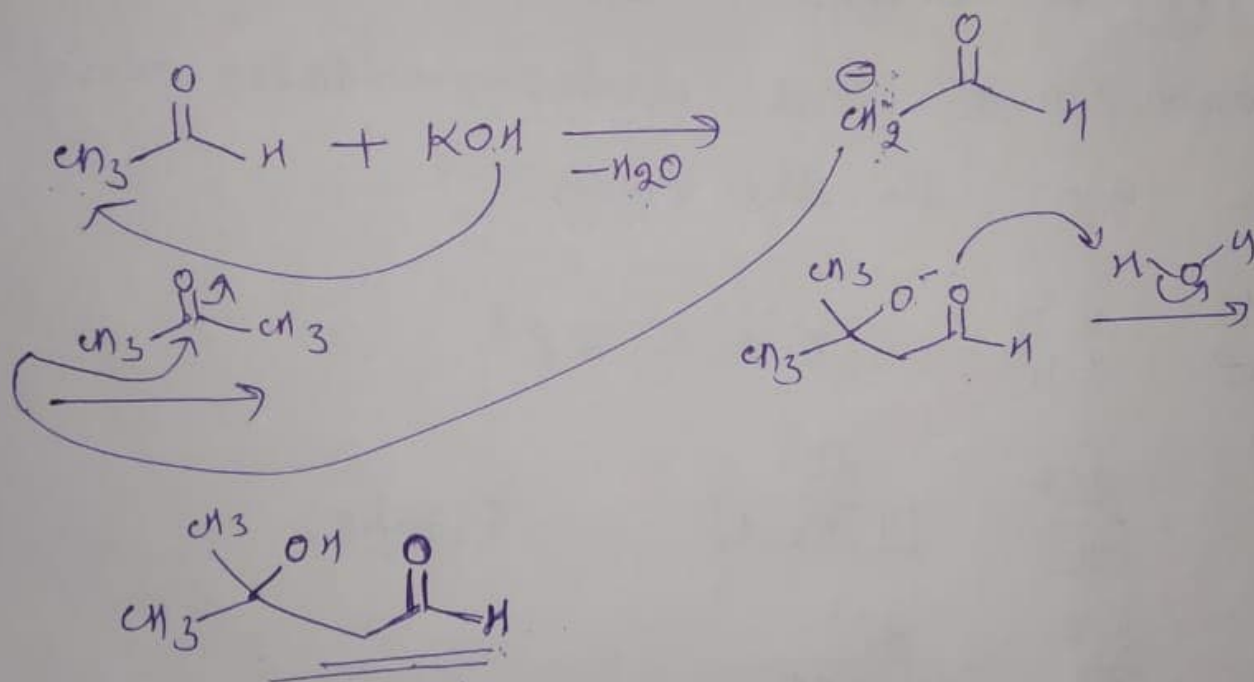
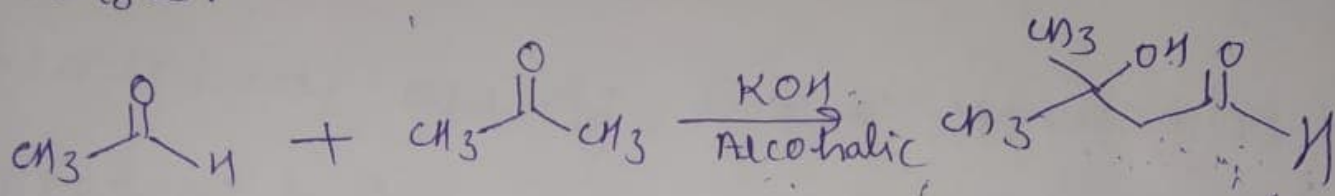
sp^3



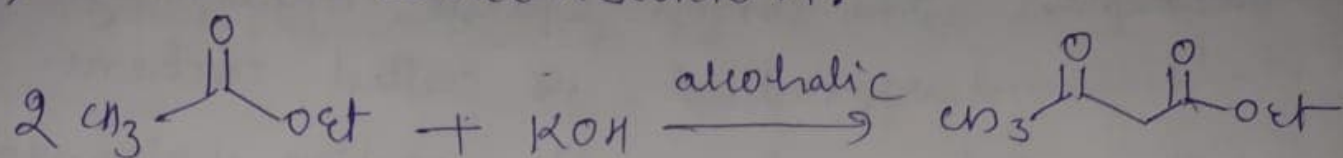
Pyramidal shape

Formation of carbanion!

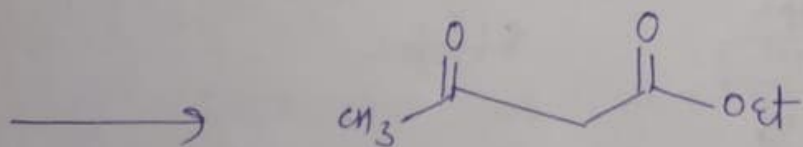
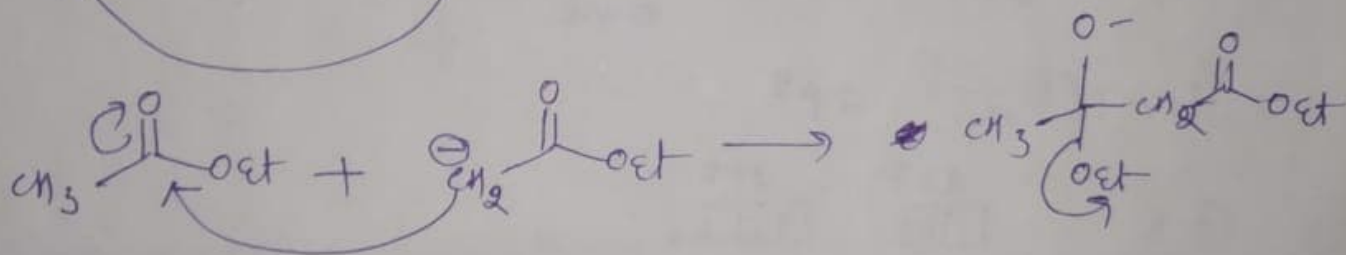
1) Aldol condensation: In Aldol condensation, carbanion is formed as intermediate when aldehyde or ketone is treated with ~~a~~ strong base.



2) Claisen condensation:

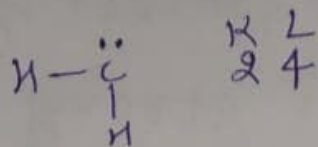


When two molecules of lower fatty esters are treated with strong base to give carbanion as a intermediate.



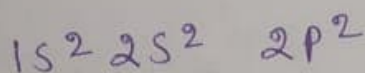
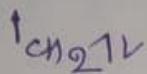
Carbene: The carbon species containing two radical is called carbene.

The carbene is reaction intermediate and has six e^- in octet.

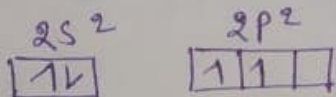


It is of two types.

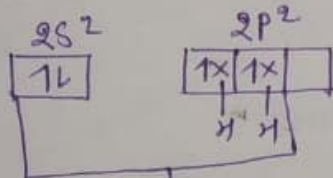
- 1) Singlet carbene: Both the e^- are in opposite spin and spin multiplicity is one.



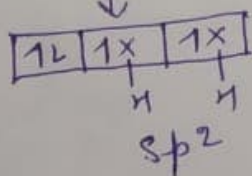
G.S



E.S



C + 2H

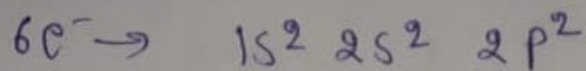
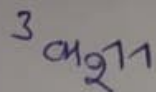


Shape

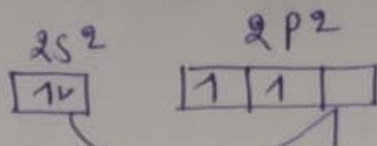


V-shape

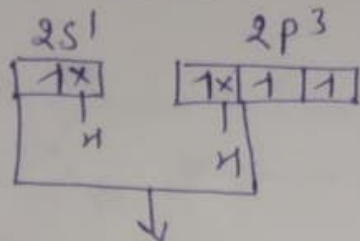
2) Triplet carbene: Both the e^- are in parallel spin and spin multiplicity is 3.



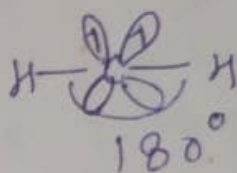
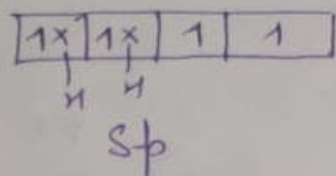
G.S



E.S



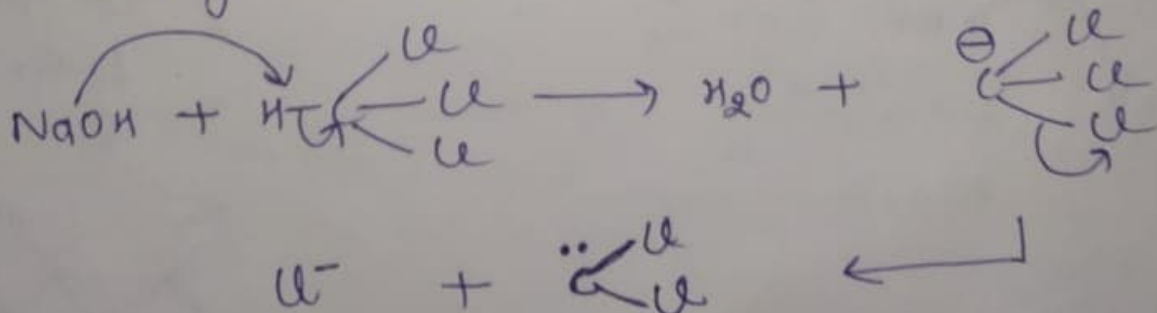
C + 2H



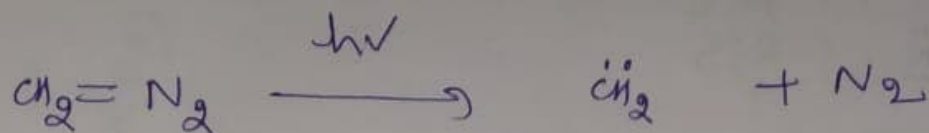
Linear

Formation of carbene:

1) carbene is formed by reaction of chloroform with base.



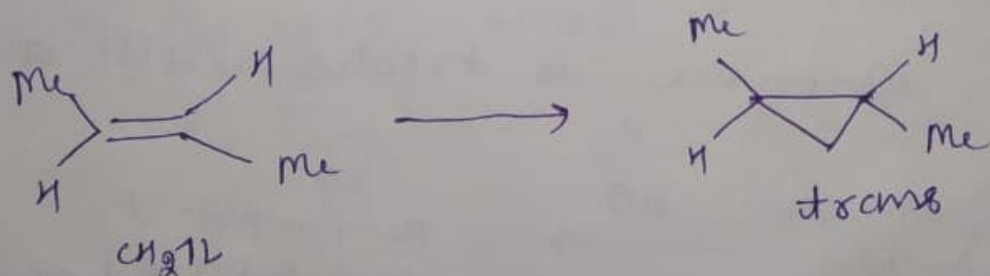
2) carbene is formed when diazo methane is irradiated with light



Reaction of carbene:

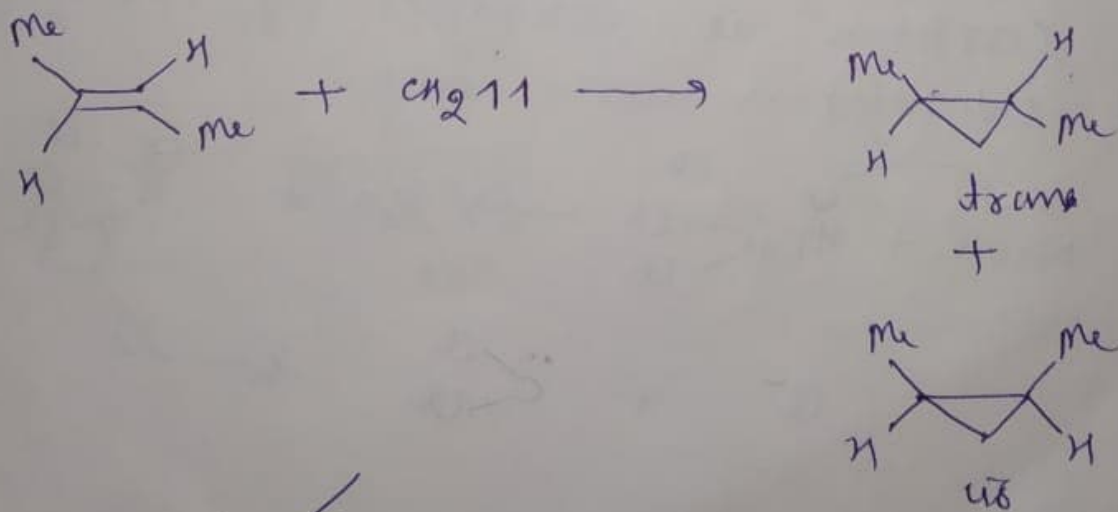
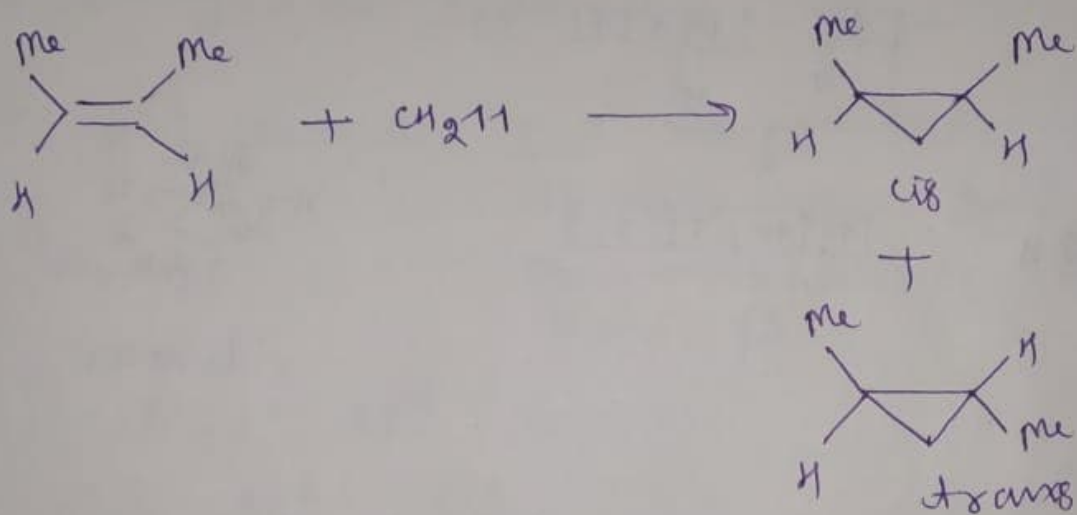
1) Singlet carbene: Singlet ~~carbene~~ carbene is stereospecific in

nature i.e. ~~cis~~ cis alkene forms cis product where as trans alkene forms trans product.

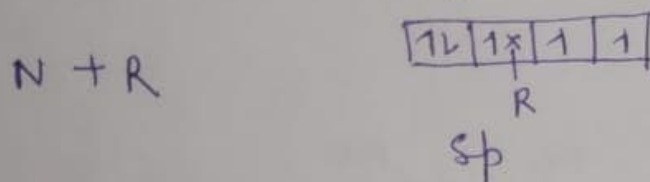
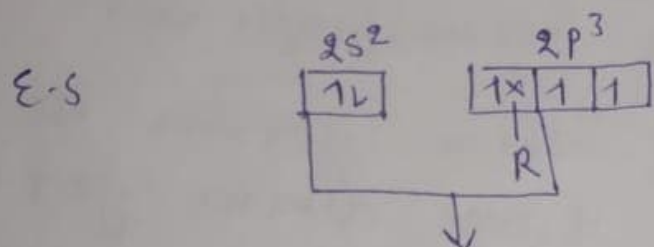
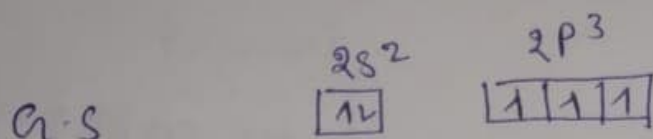
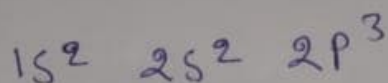
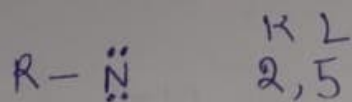


2) Triplet carbene: It is non stereo specific in nature.

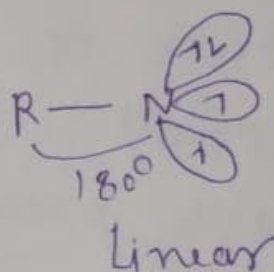
cis or trans, both alkene give a mixture of cis and trans product.



Nitrene: Nitrenes are intermediate and has six e^- in orbit.

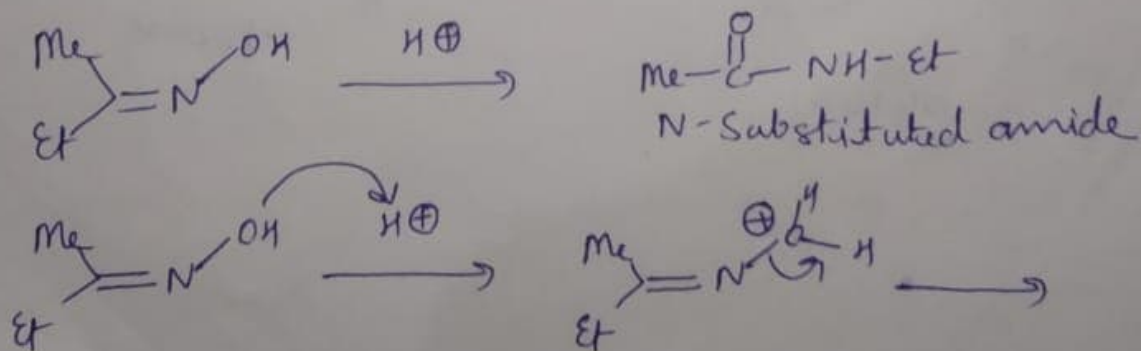


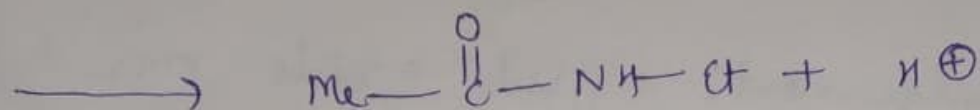
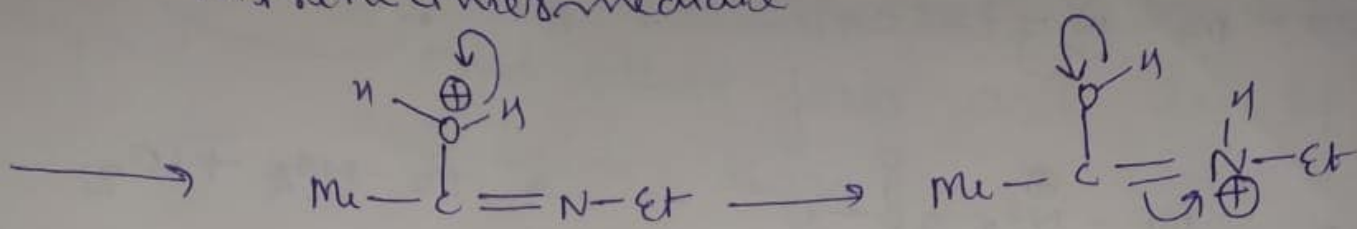
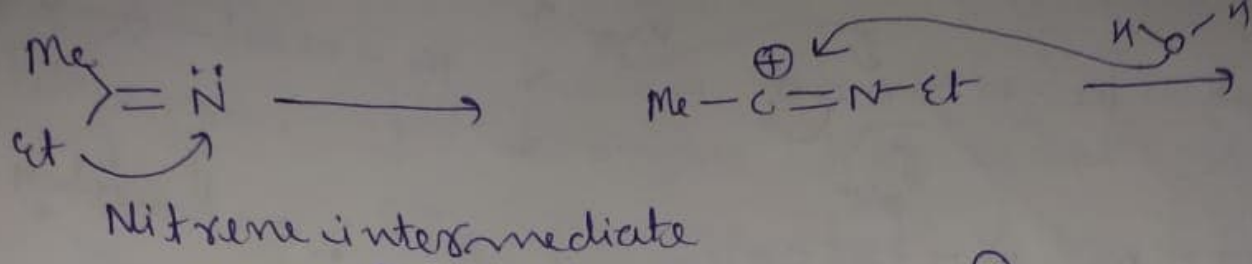
shape



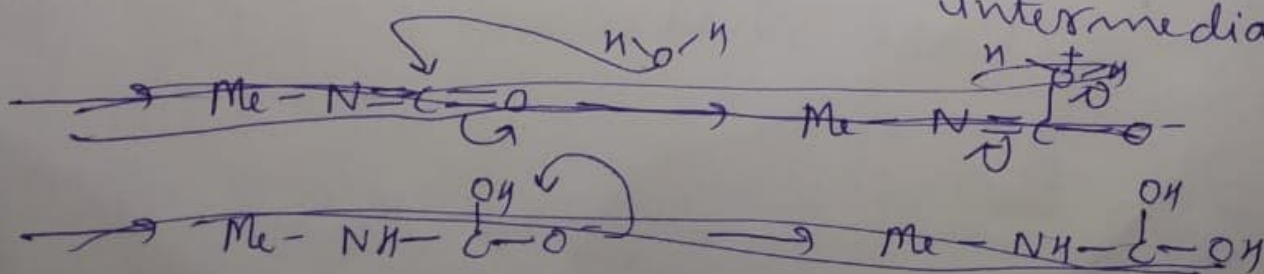
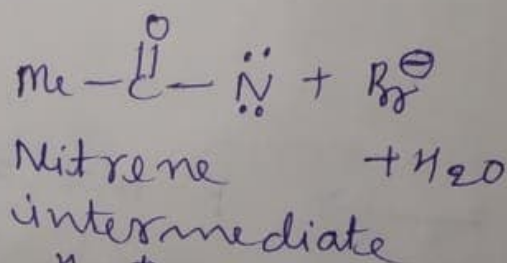
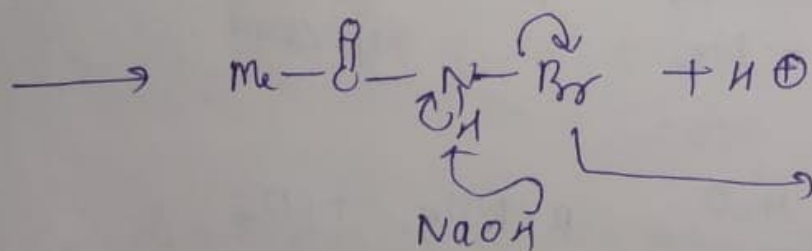
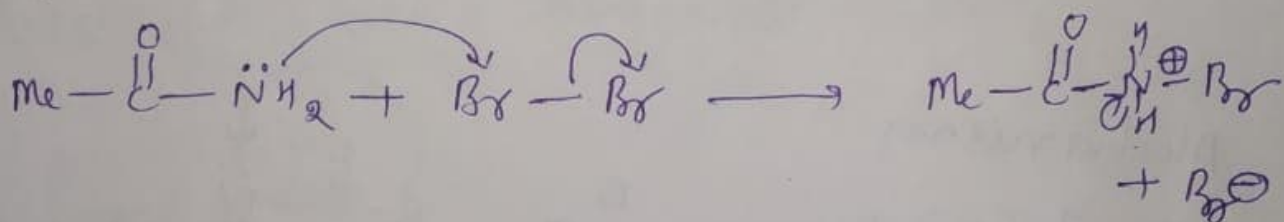
Formation of Nitrene:

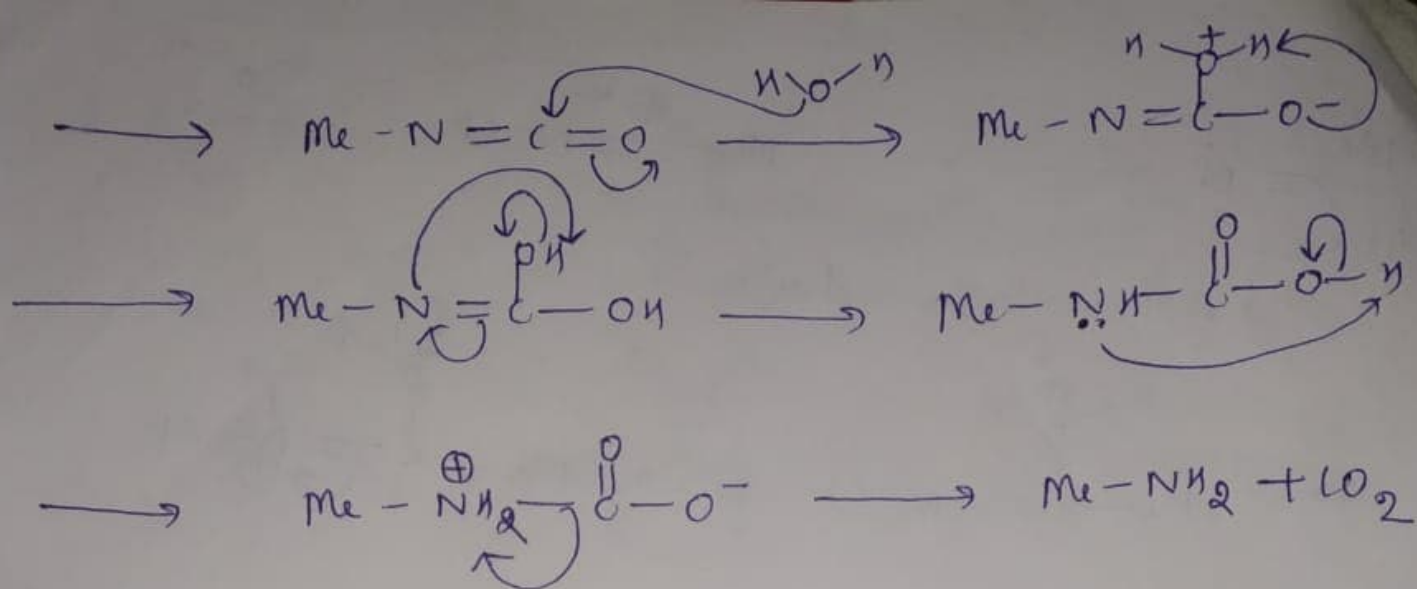
Beckmann Rearrangement: Nitrene is formed, when keto oxime is treated with acid.



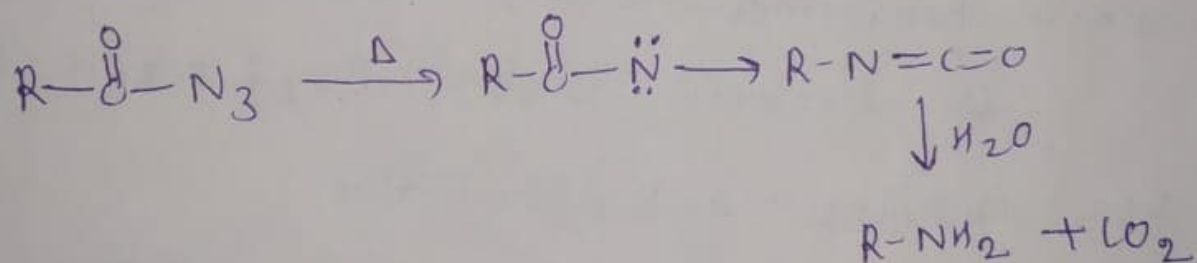


Hofmann Rearrangement: when a primary amide is treated with $\text{Br}_2 / \text{NaOH}$ to give Nitrene intermediate:

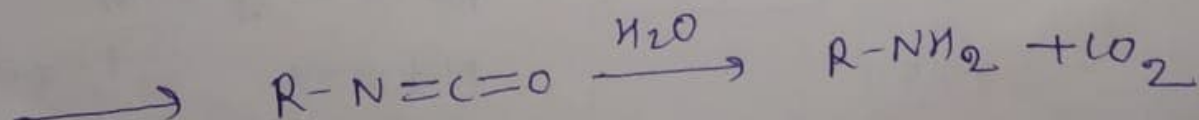
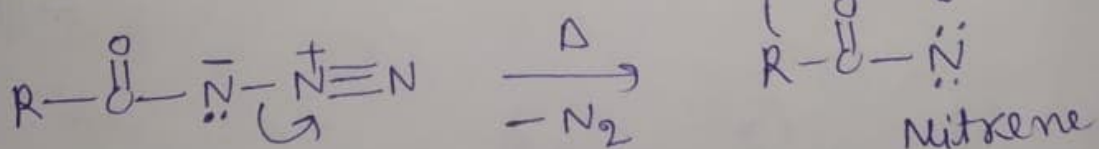




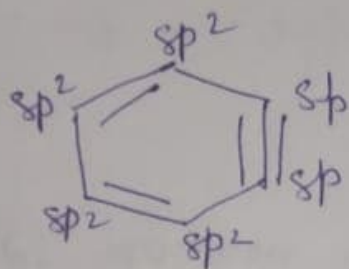
Curtius Rearrangement: Acid azide on heating to give nitrene.



Mechanism

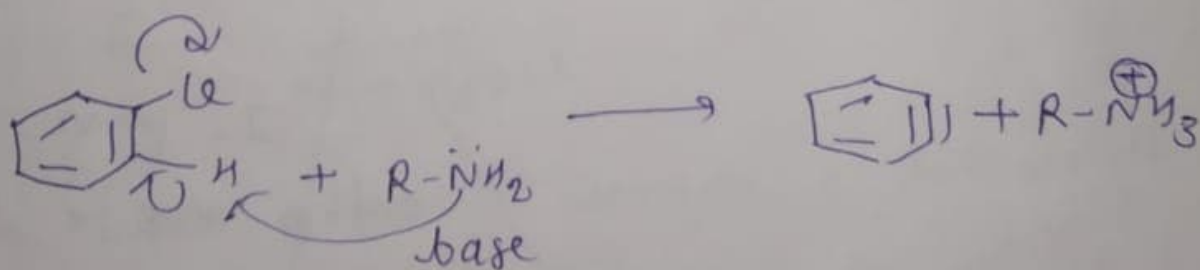


Benzynes: In benzyne, two carbons are in sp hybridization and other four are in sp^2 hybridization

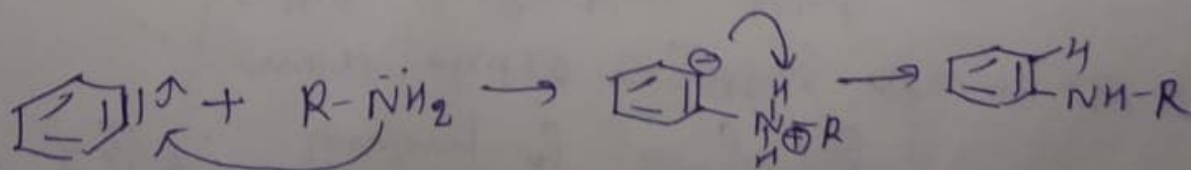


Formation of Benzyne:

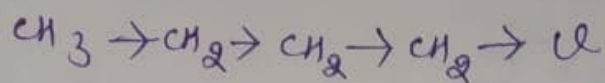
The reaction of chlorobenzene with base to give benzyne.



Reaction: Benzyne generally gives nucleophilic addition.



Inductive Effect: Tendency of shifting e^- towards more electronegative atom is called inductive effect.



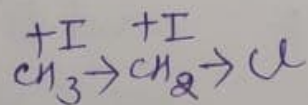
It is of two types

~~E⁺ an~~

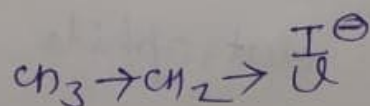
I^+ and I^-

$I^+ \rightarrow$ ~~when e^- tendency of e^- is toward more e^-~~

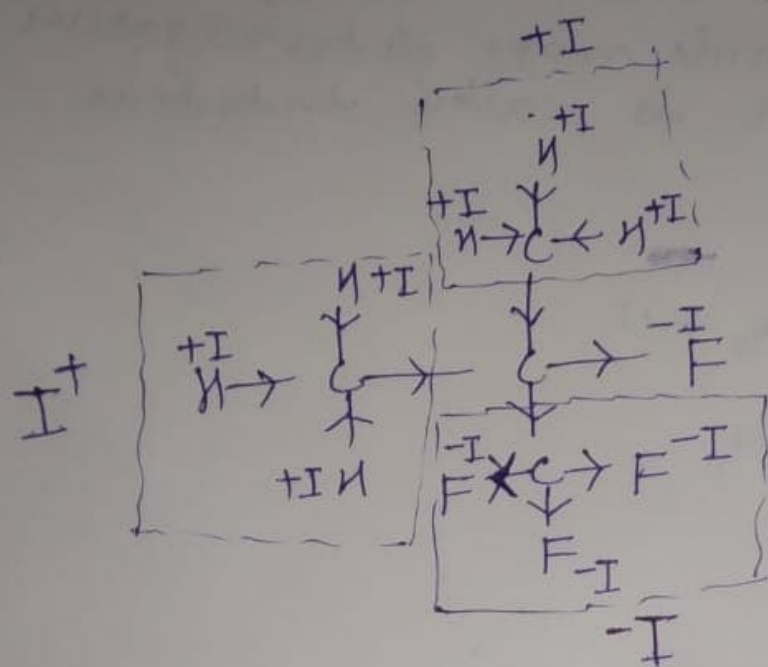
when atom push e^- toward more electronegative atom is called I^+



$I^- \rightarrow$ when atom attracts e^- toward it. It is called I^-

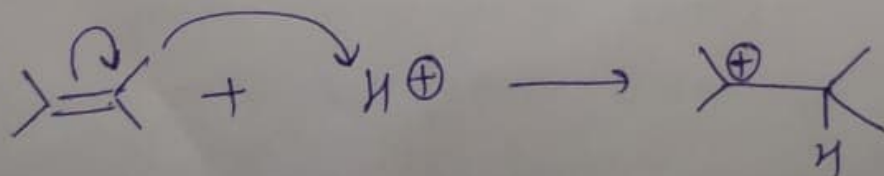


example of I^+ and I^- effect

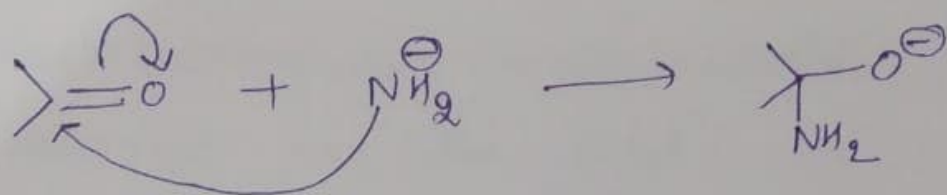


Electromeric effect: Separation of charge by attacking species is called electromeric effect. It is two types i.e. E^+ and E^- respectively.

$E^+ \rightarrow$ Transfer of e^- toward positively charged species and attacking species are electrophile. It is called E^+



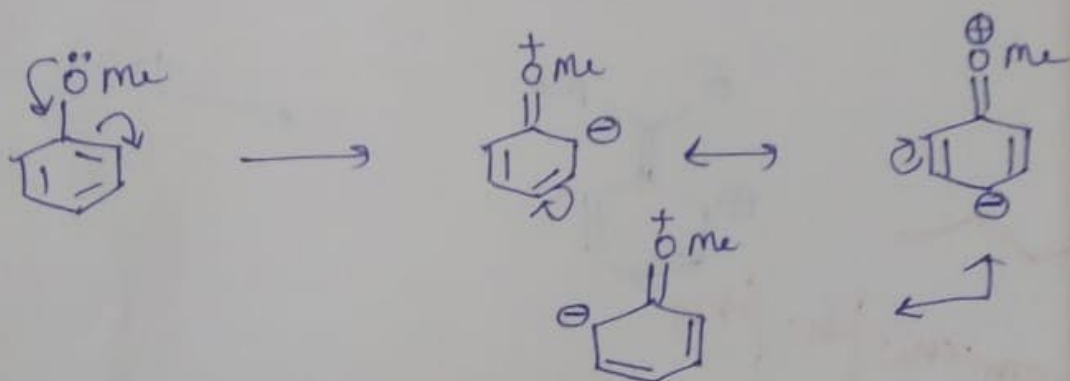
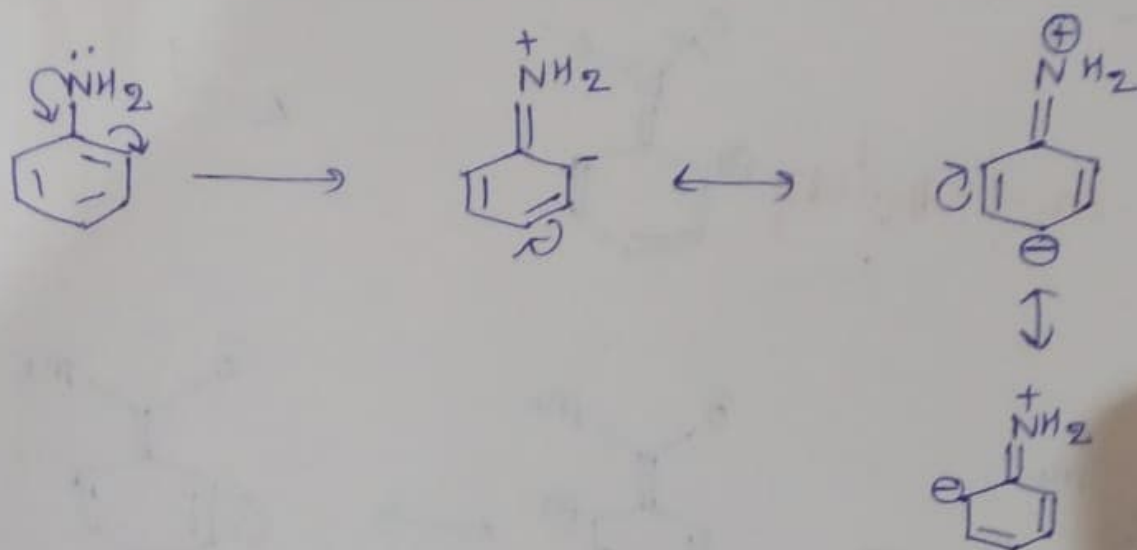
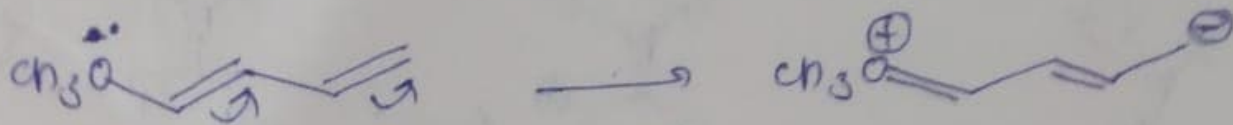
$E^- \rightarrow$ when attacking species are nucleophile. The e^- are transferred from nucleophile to substrate molecule. This type of effect is called E^- effect.



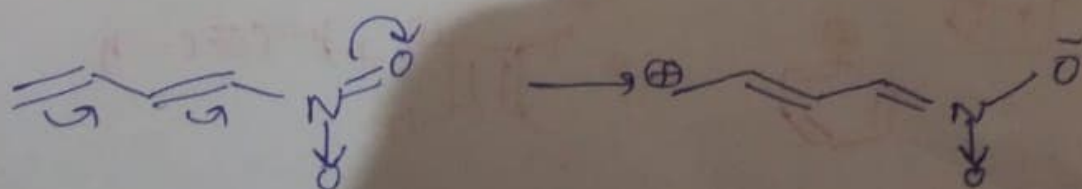
Mesomeric effect \rightarrow mesomeric effect is defined as the polarity produced in the molecule by interaction of two π bonds or between a π bond and lone pair of e^- present on an adjacent atom.

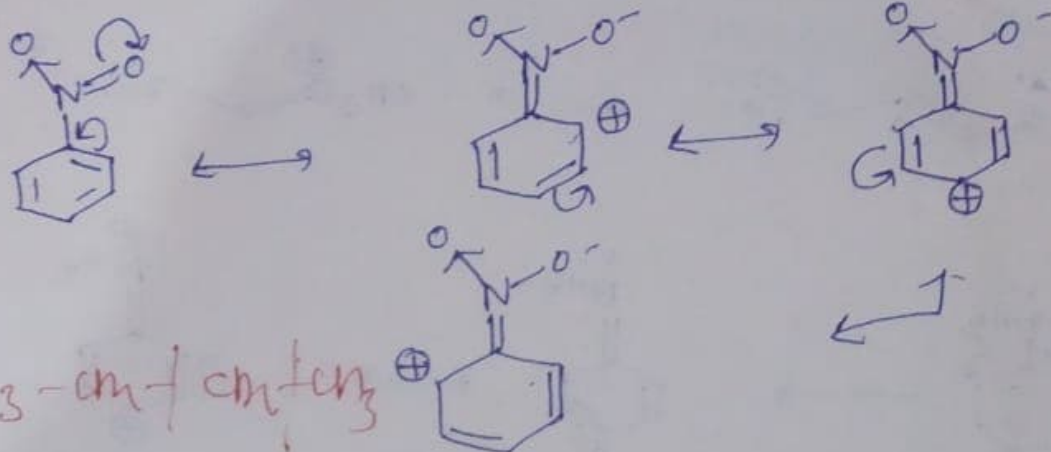
It is of two types
 m^+ and m^-

1) m^+ : when group or atom donate the e^- pair to the conjugated system. It is called m^+

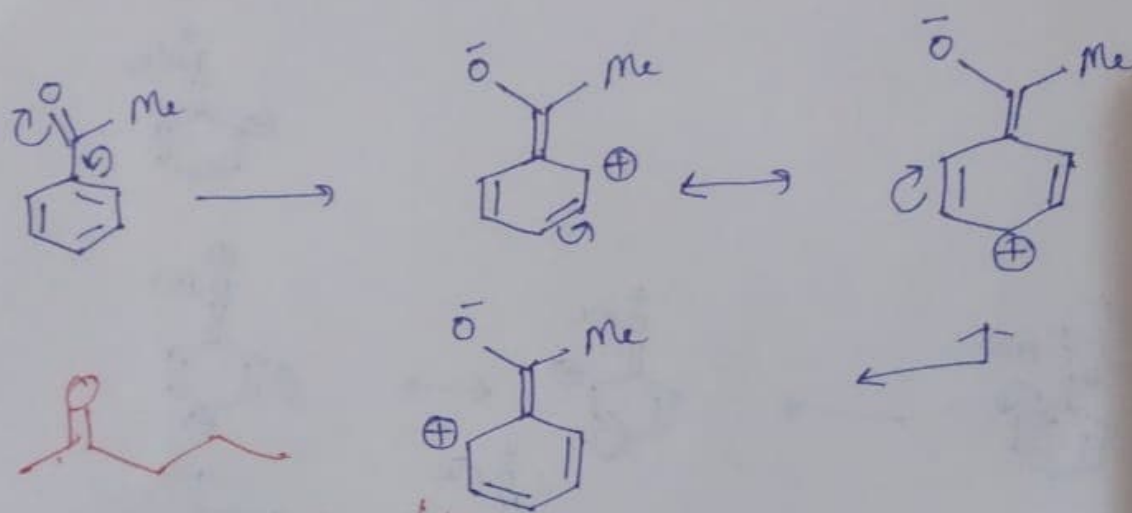


M^- : when group attracts the lone pair of e^- from molecule. It is called M^- effect





$\text{CH}_3 - \text{CH} - \text{CH} - \text{CH}_3$



$\text{CH}_3 - \text{CH} - \text{CH} - \text{CH}_3$

