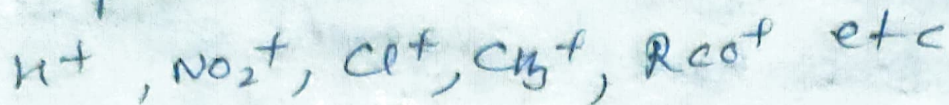


Types of Reagent :-

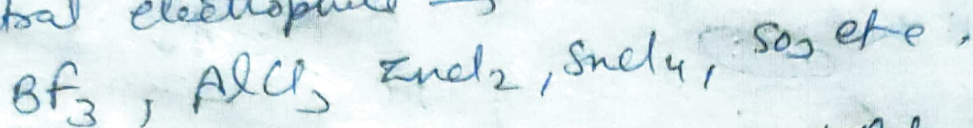
(a) Electrophile :- Electrophiles are electron ^{loving} ~~loving~~ species ~~accept~~ ^{accept} one lone pair of e^- there are either

positive charge ion or neutral molecule and in nature electron deficient species.

eg :- positive electrophile -

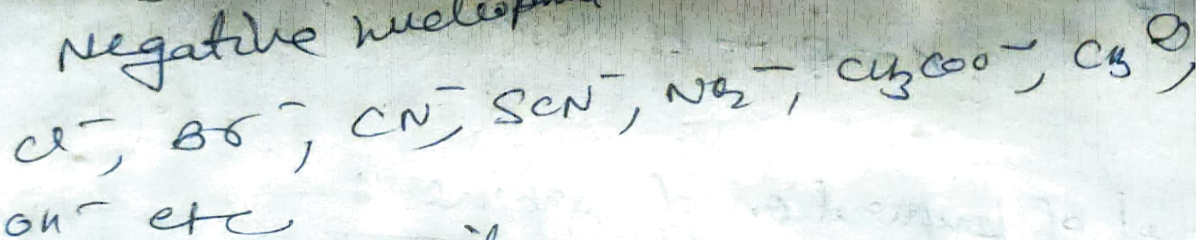


Neutral electrophile $\rightarrow$

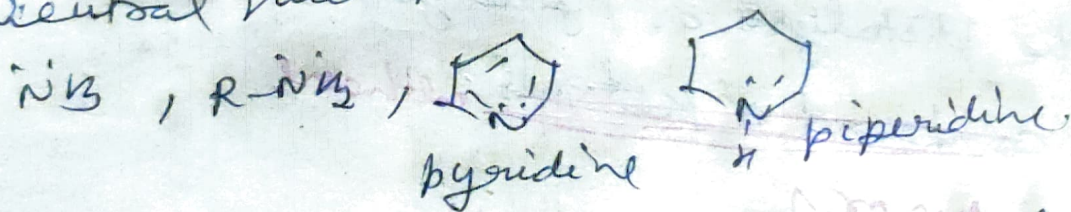


(b) Nucleophile :- These are ~~nucleophilic~~ ^{electron} ~~loving~~ species and donate at least one lone pair of e^- so it behaves as Lewis base nucleophile are maybe negative ion or neutral molecules.

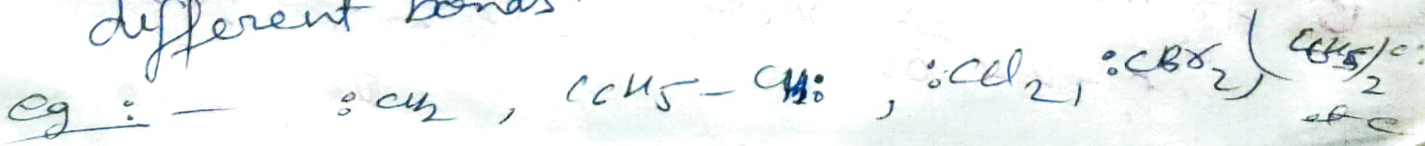
eg Negative nucleophile -



Neutral nucleophile -



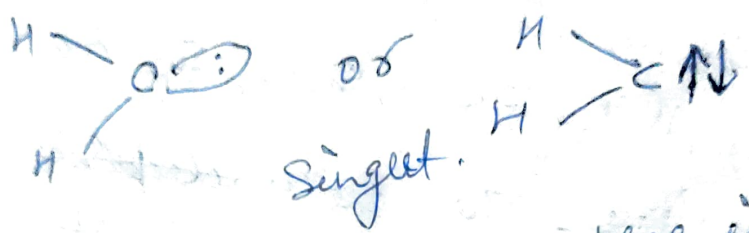
Carbene :- It is neutral, bivalent reaction intermediate having two unshared electrons. These two electrons are derived from two different bonds.



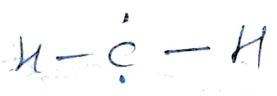
Types of carbene carbene are two types -

- (i) Singlet carbene. (ii) Triplet carbene.

(i) Singlet carbene :- such carbene, in which both the electrons are found in the same orbital with antiparallel spins are called singlet carbene. Singlet carbene have no magnetic moments.



(ii) Triplet carbene :- such carbene in which electrons are found in two different orbitals with parallel spins are unpaired are called triplet carbene.

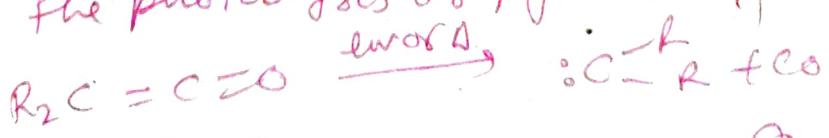


method of preparation of carbene :-

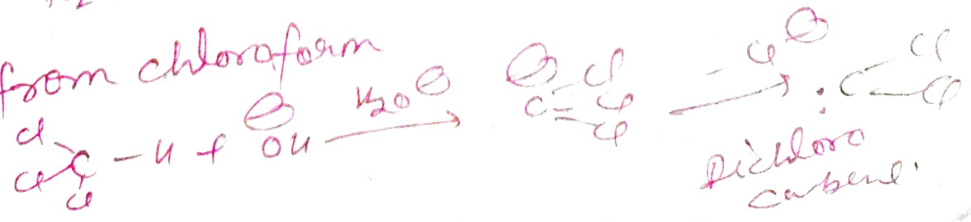
① By the photolysis or pyrolysis of aliphatic diazo compound or ketenes methane



② By the photolysis or pyrolysis of ketene



③ from chloroform



Stability of carbene:

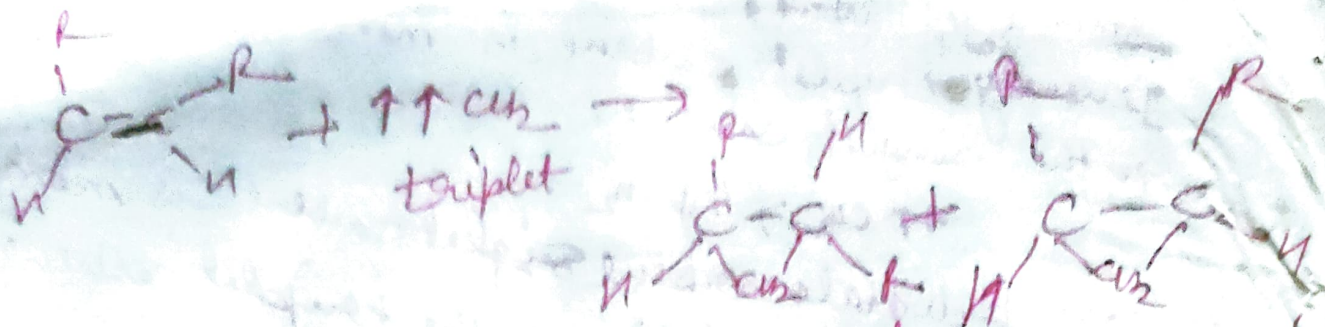
generally triplet carbene is more stable in comparison to the singlet carbene.



In case of dihalocarbene singlet carbene is more stable in comparison to the triplet carbene



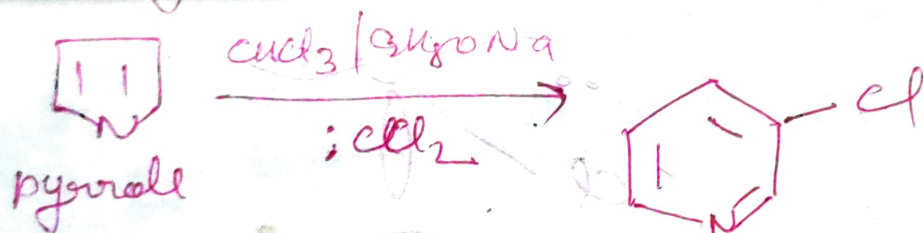
In case of singlet dihalocarbene the lone pair of halogen atom occupies vacant p-orbital so C-X bond have double character that's why singlet dihalo carbene is the more stable in comparison to the triplet dihalo-



Singlet carbene is stereospecific in nature because it gives cis product with cis alkene while trans product with trans alkene. On the other hand triplet carbene is non stereospecific in nature because it gives a mixture of product with cis alkene.

This reaction is used to

② Ring Expansion Reaction : —



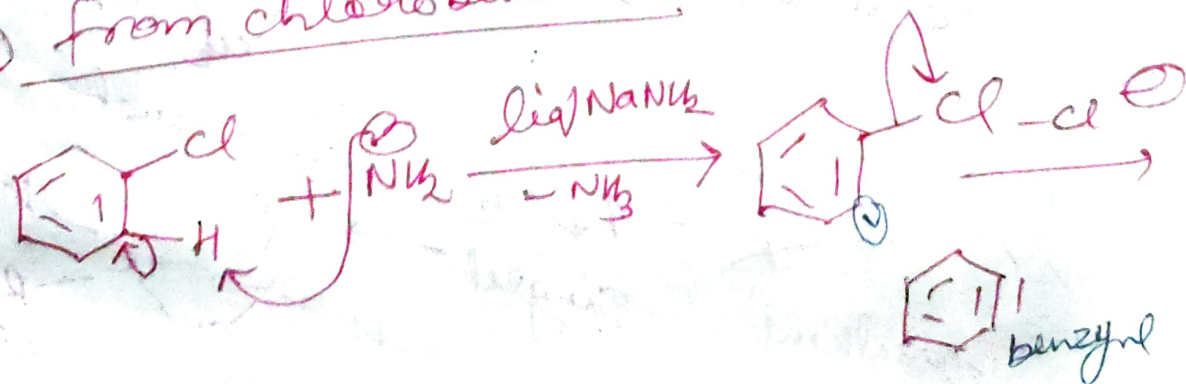
3-chloropyridine

Nitrene : —

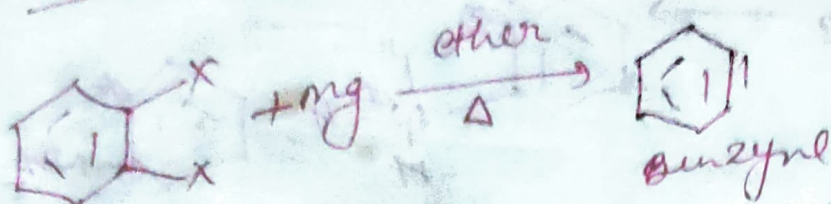
Asynes : —

preparation of Asynes : —

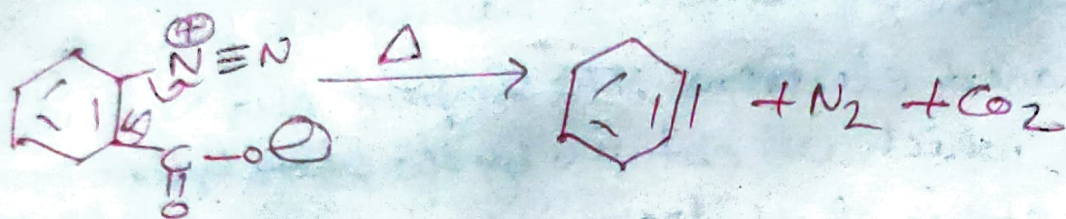
① from chlorobenzene : —



② from dihalobenzene : -

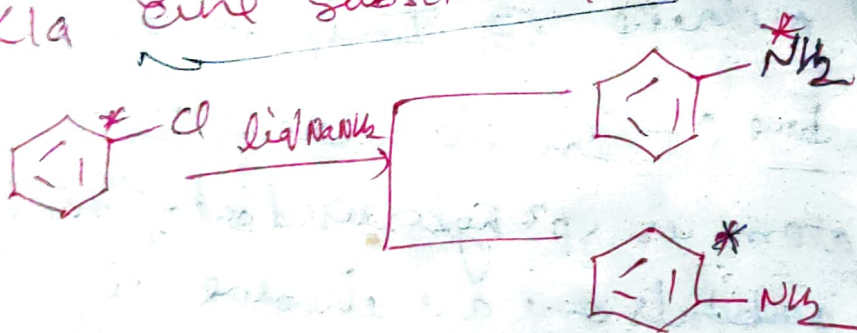


③ from ~~two~~ carboxylate benzenediazonium salt : -



(b) when both ortho position of halo benzene is X blocked then the reaction does not occur.

If nucleophile adopt ortho position of the leaving group then such a substitution is Kla cine substitution.



The formation of two aniline proves the benzyne mechanism -

