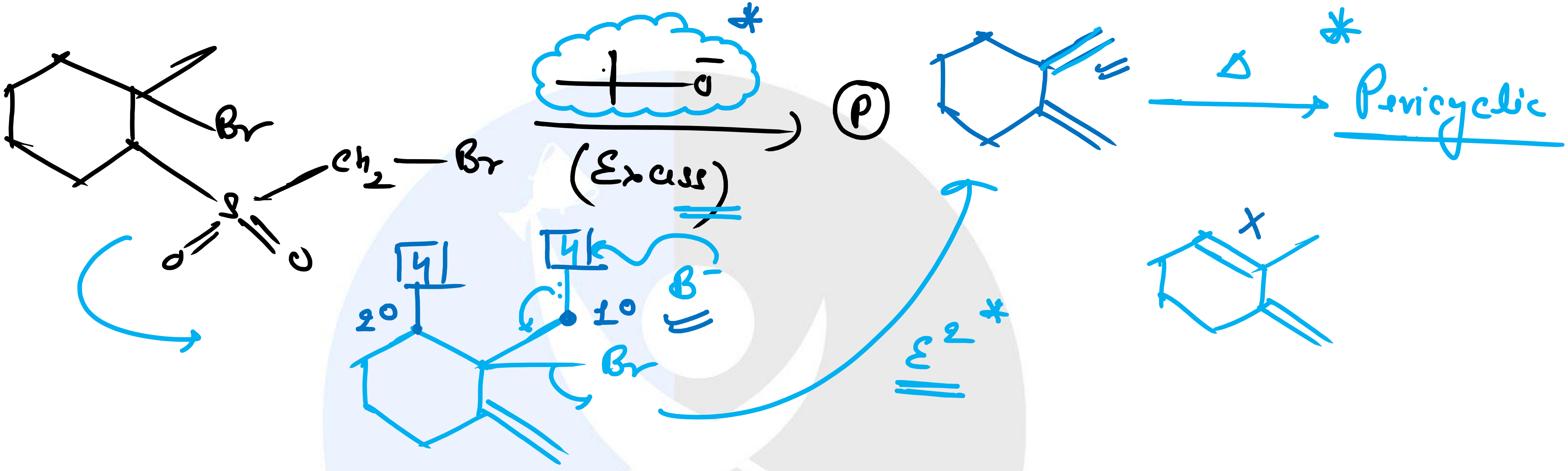
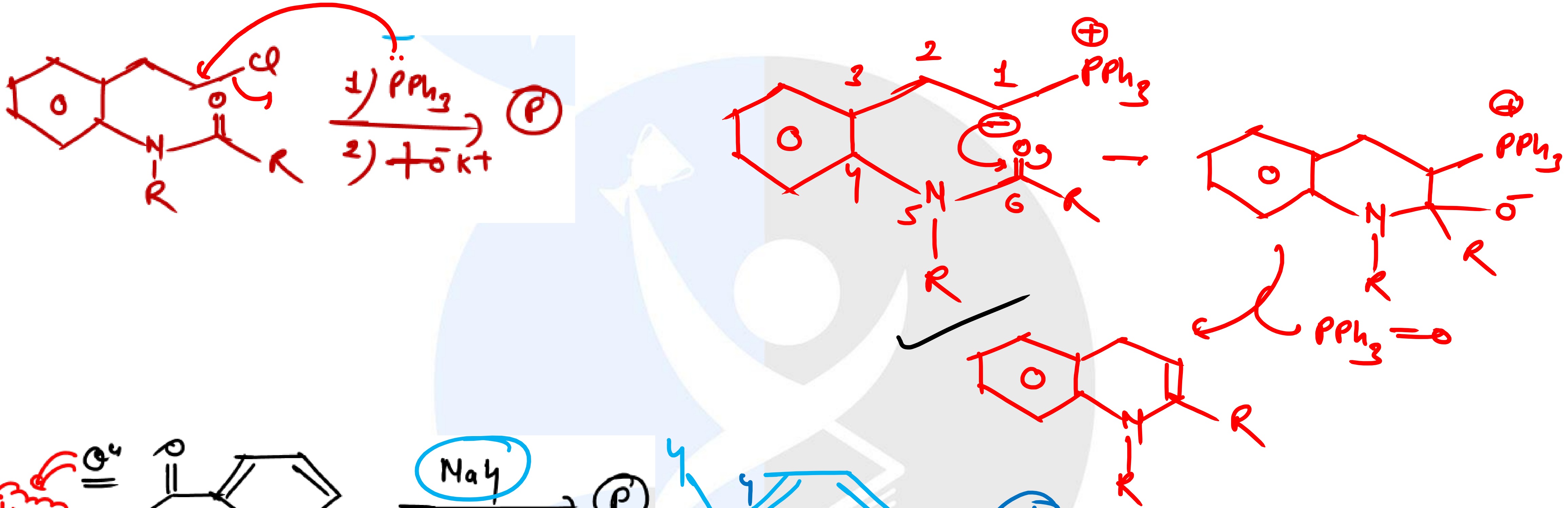
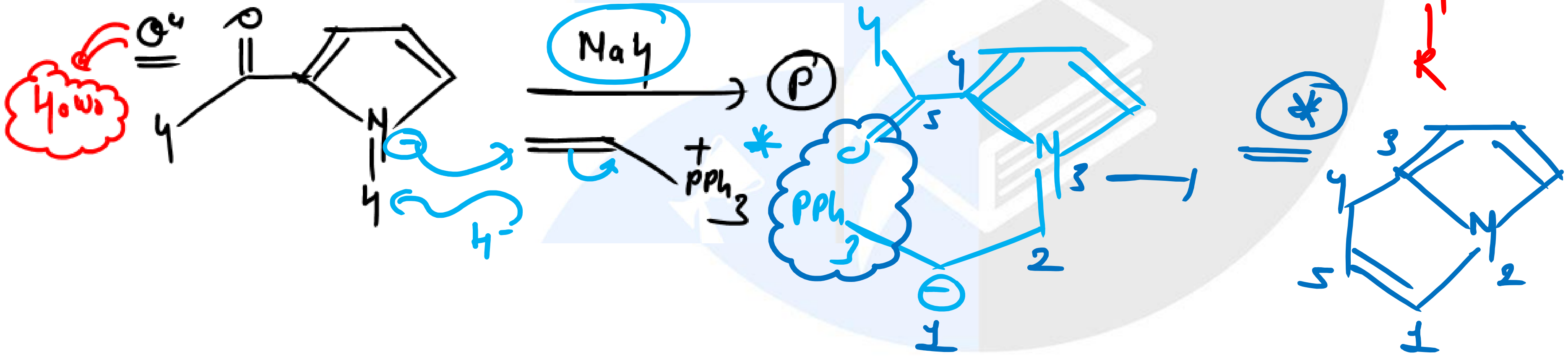
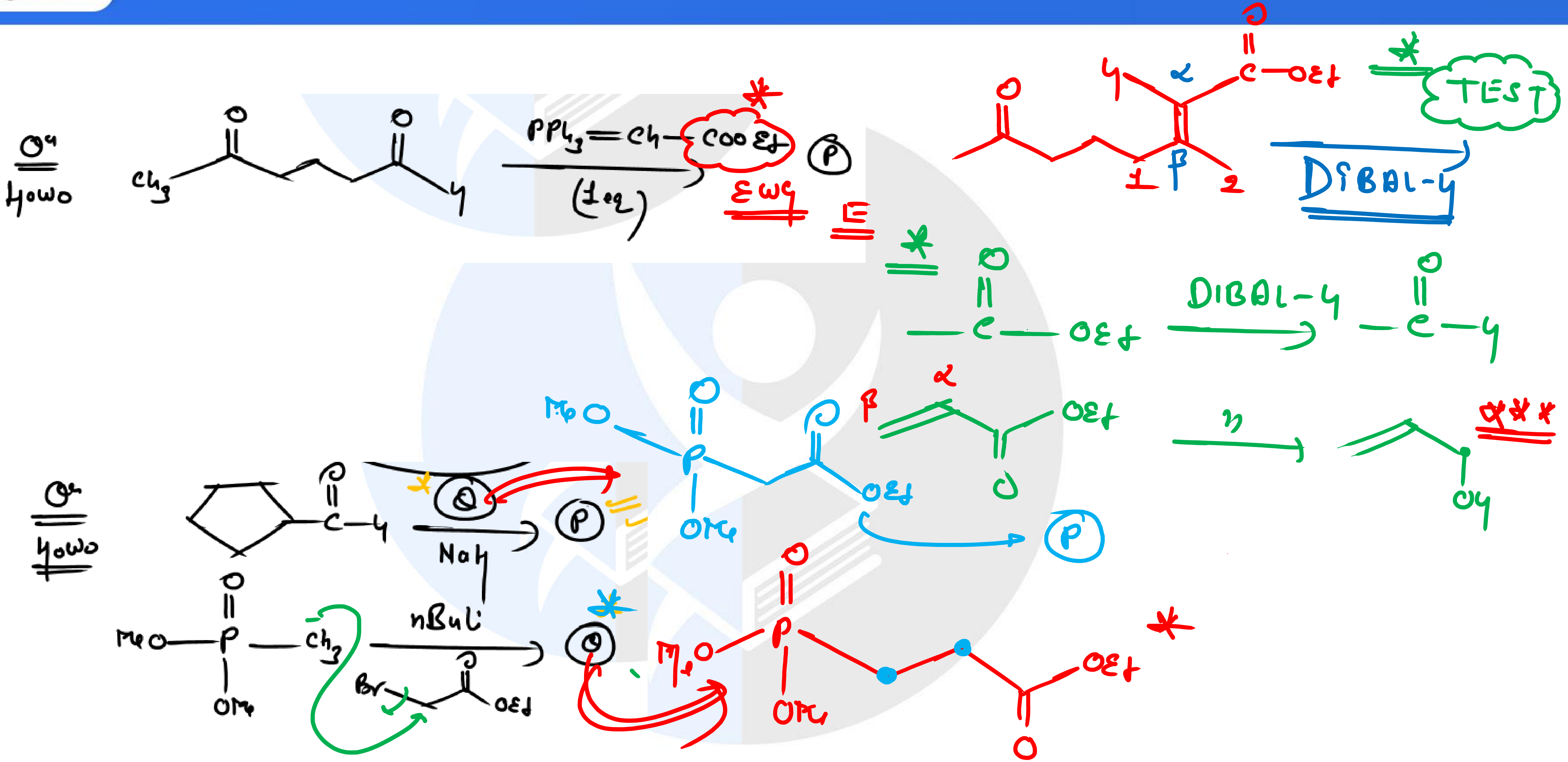
Q.

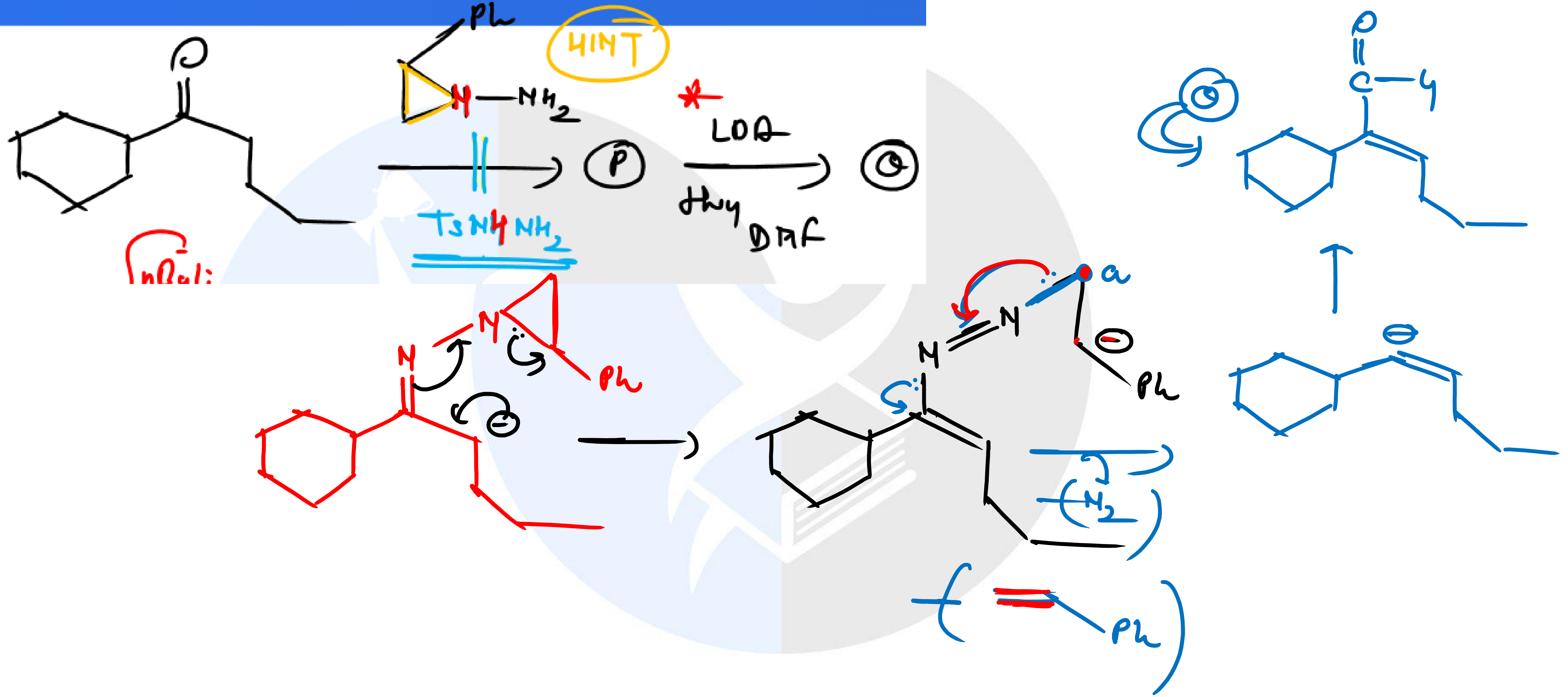
40 Wo




1) PPh3
2) +O⁻K+
PPh3 =O

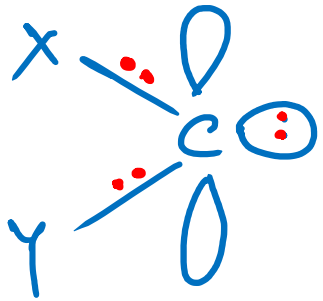

NaH
PPh3


Q. How?
$PPh_3=CH-COOEt$
(1 eq)
EWG
E
TEST
DIBAL-H
DIBAL-H
OEt
Q. How?
NaH
nBuLi
Br
OEt
MeO
OMe
OMe
OEt
OMe
OEt
OH



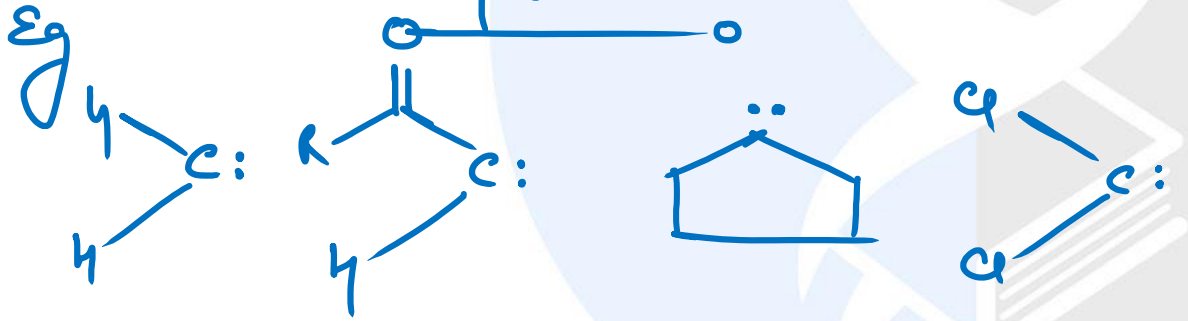
Ph
NH2
HINT
LDA
dry DMF
P
Q
TsNHNH2
N
Ph
a
Ph
N2
Ph
O
C—H

* Carbene *



* divalent species.
* 6 $\bar{e}$ = Et
* Neutral

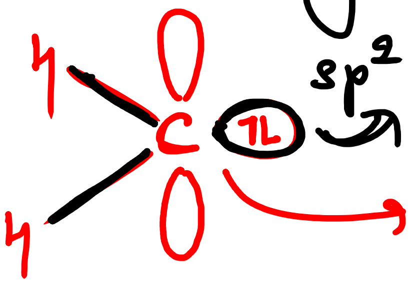
Eg



Carbene

Singlet

V/Bent shape.



sp^2 H.O.O

sp^2 S.N. = 3

* No unpaired $\bar{e}$
Hence, Diamagnetic.

* ESR inactive.

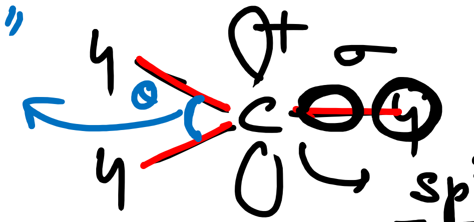
$\uparrow \left(s_1 = +\frac{1}{2}\right) \quad \downarrow \left(s_2 = -\frac{1}{2}\right)$

$$S = |s_1 + s_2| = \left|+\frac{1}{2} - \frac{1}{2}\right| = 0$$

$$SM = 2S + 1 = 2(0) + 1 = 1 \rightarrow \text{Singlet}^*$$

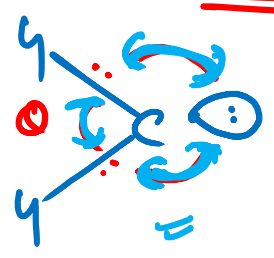
Triplet

"TOPO"



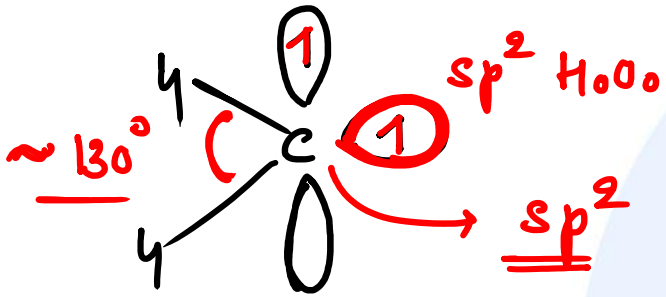
sp^2

S.N. = 3 *

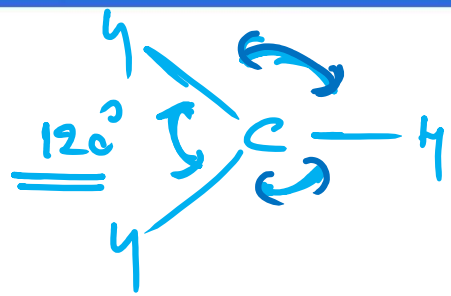


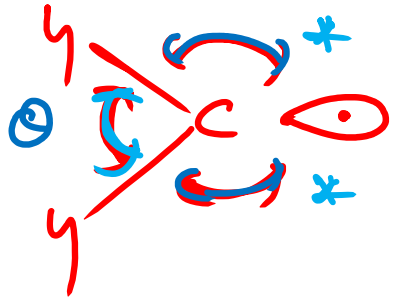
(100°–110°)

"Triplet"



* Unpaired e⁻ present
* Paramagnetic
* ESR Active





$1\ s_1 = +\frac{1}{2} \quad 1\ s_2 = +\frac{1}{2}$

$S = |s_1 + s_2| = |+\frac{1}{2} + \frac{1}{2}| = 1$

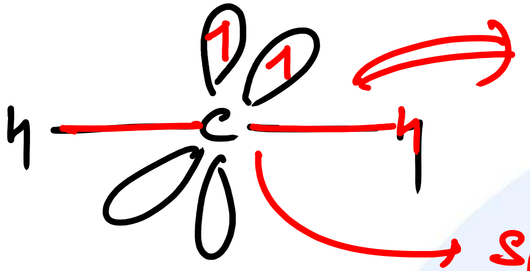
$SM = 2S + 1 = 2(1) + 1 = 3$

* Triplet *

Spin multiplicity

Repulsion: LoPo — LoPo > "LoPo - S.B.P" > "S.B.P - S.B.P" > S.B.P - Radical.

Rare (2).



SM = 3 (Triplet)

sp (S.H. = 2)

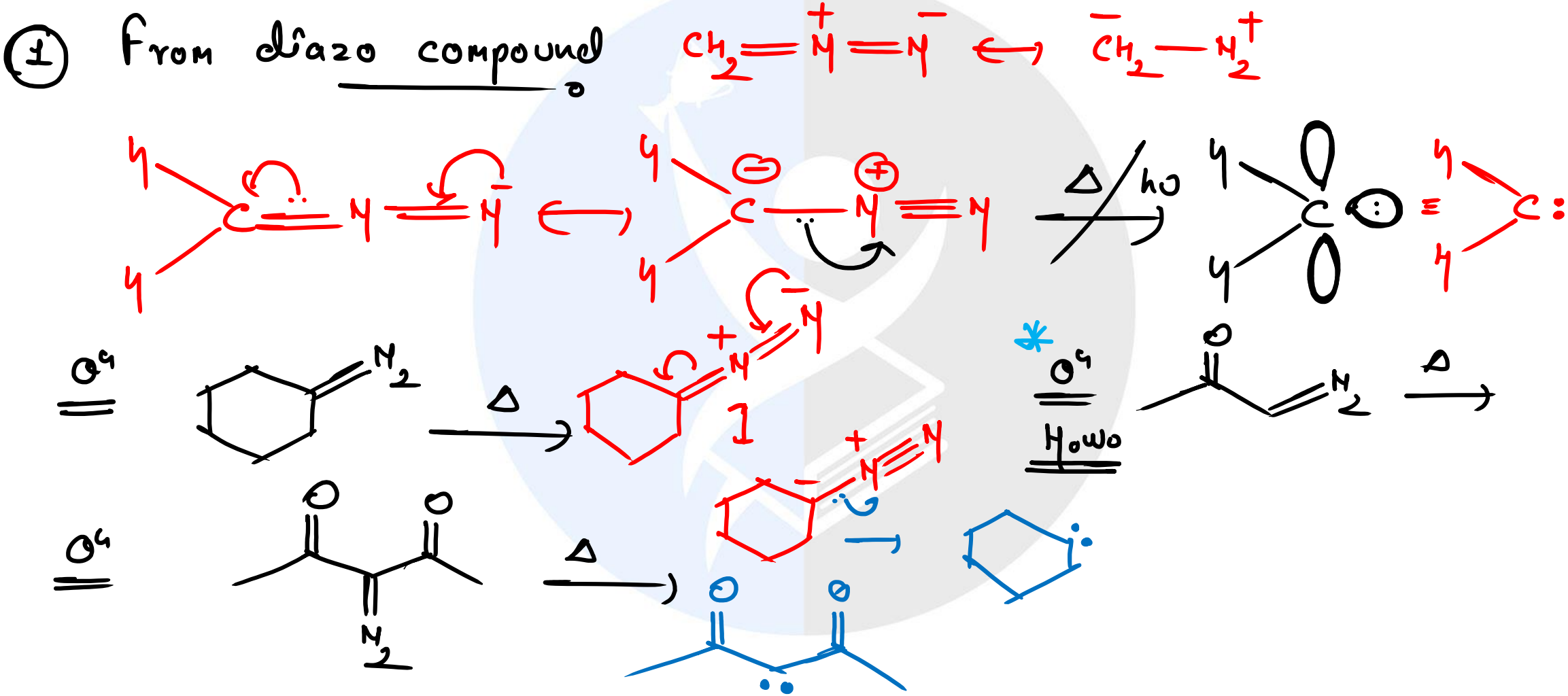
B.A. = 180°

Para.

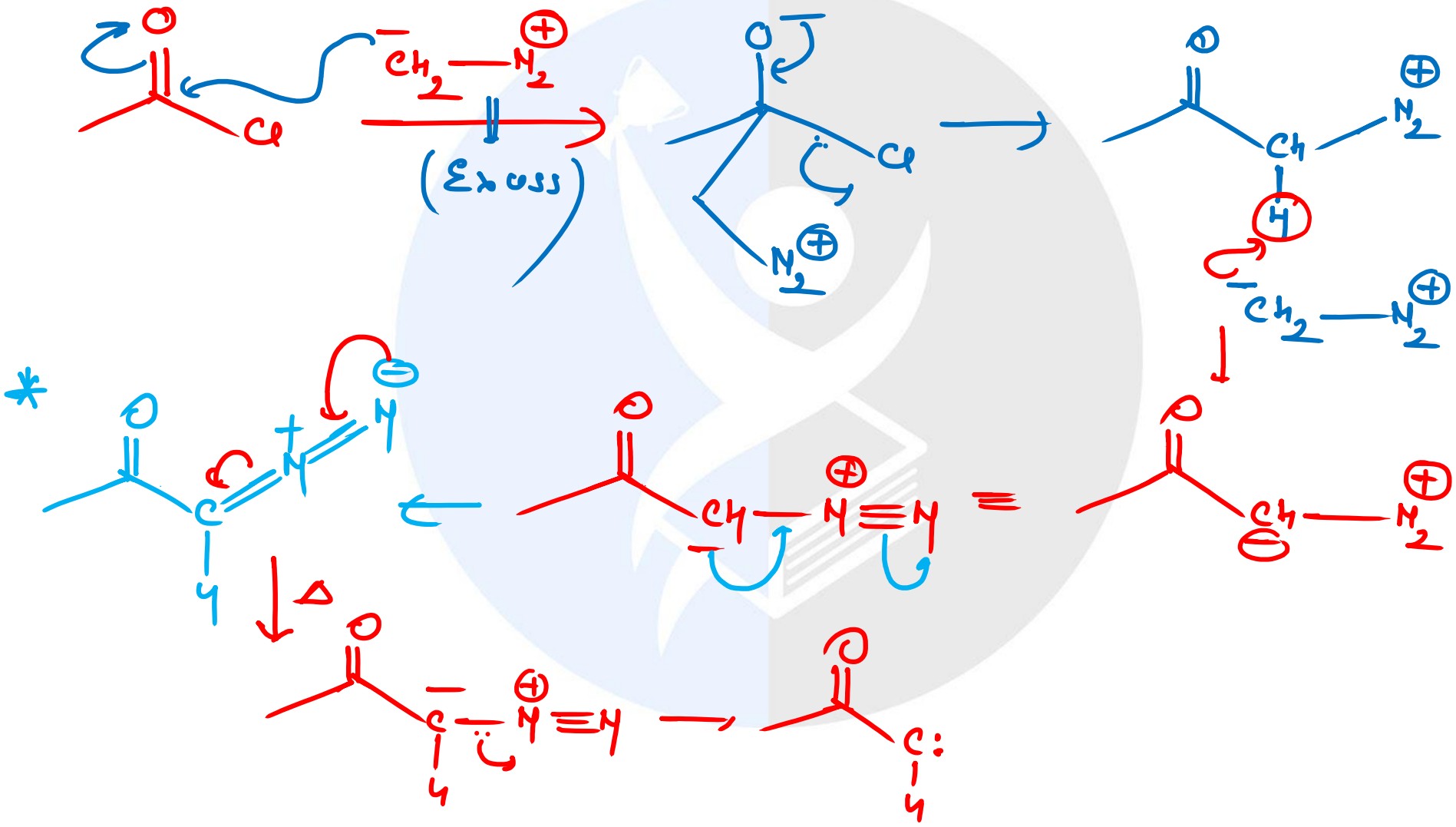
ESR active.

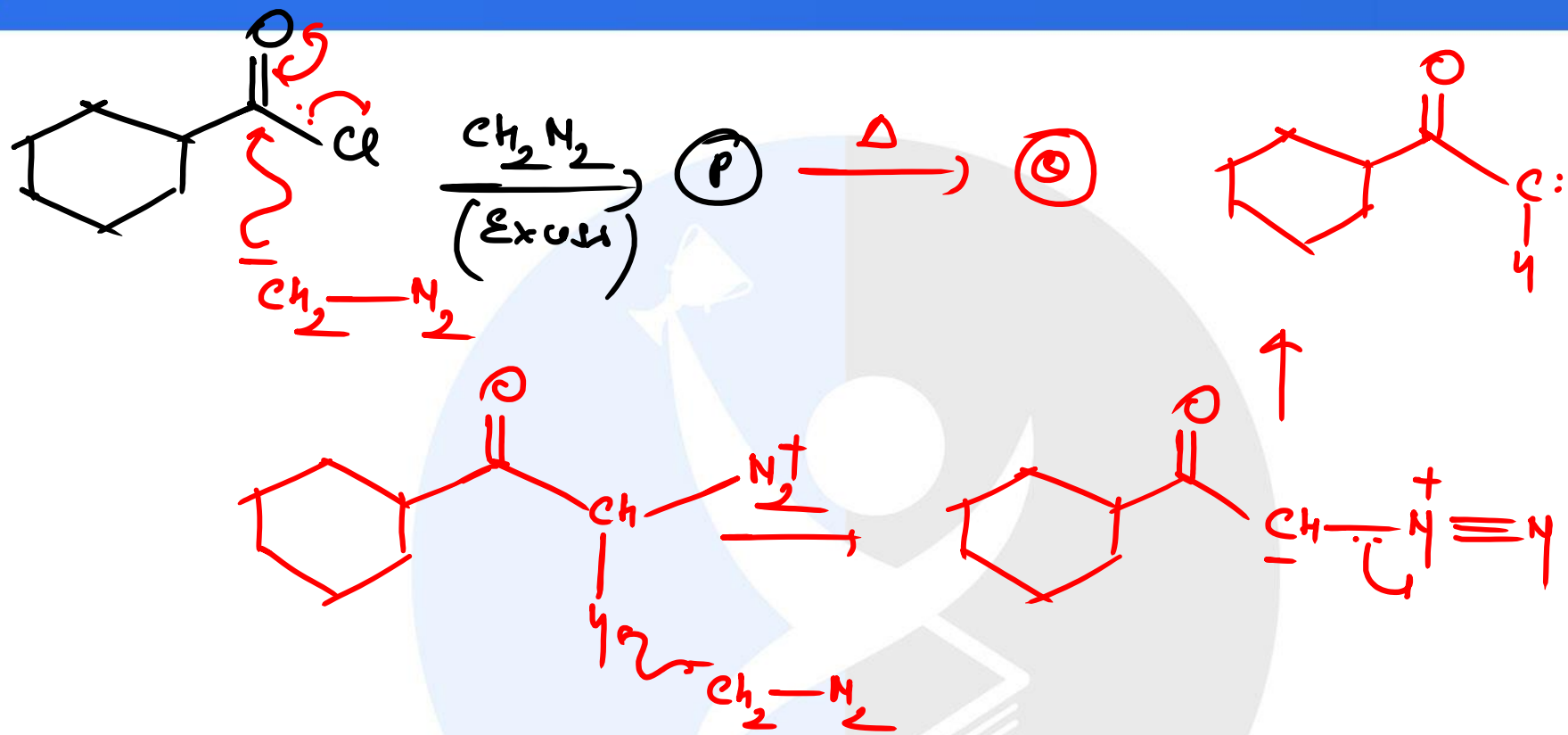
Generation of Carbene

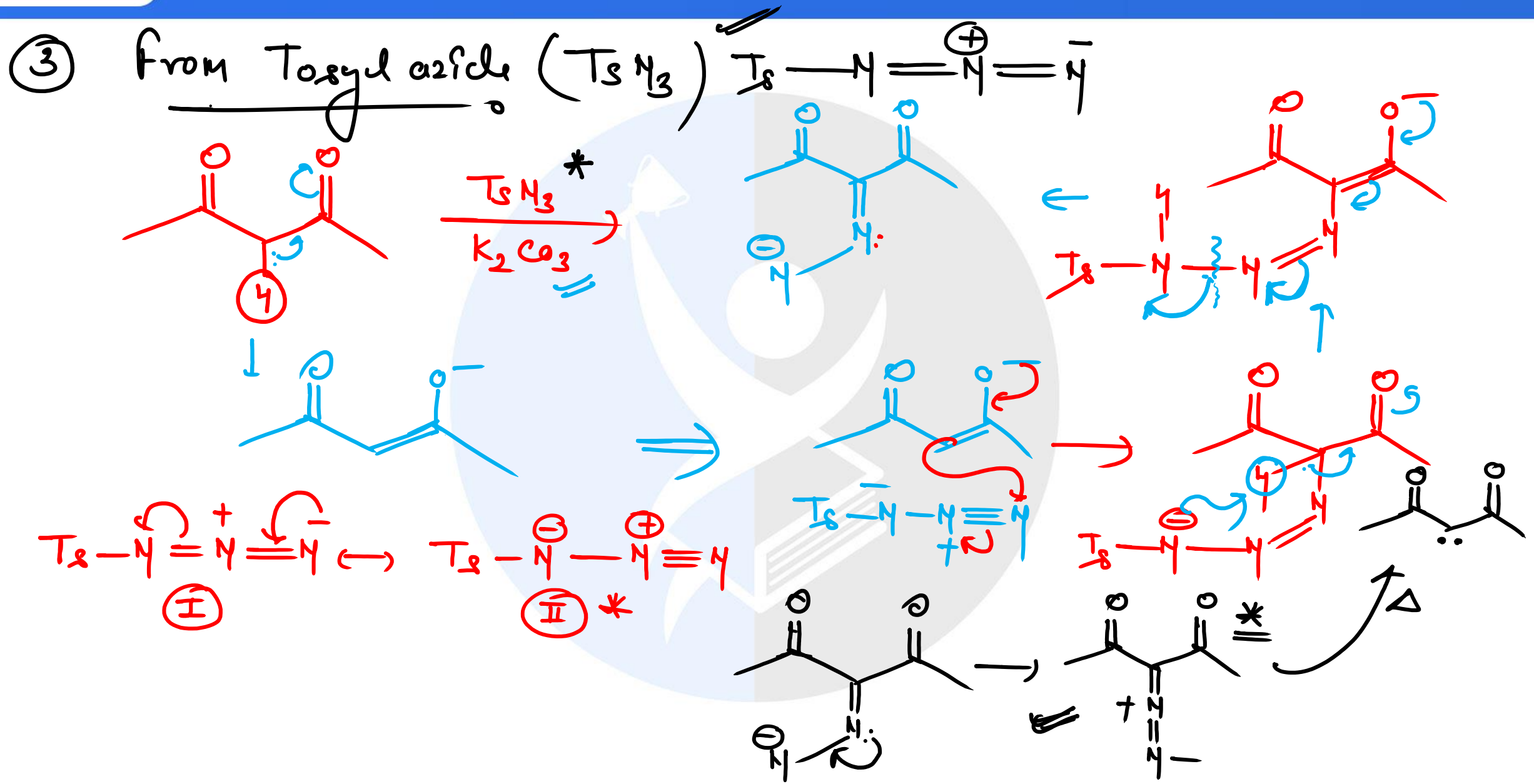
(1) From diazo compound



(2) Formation of "diazo ketone"

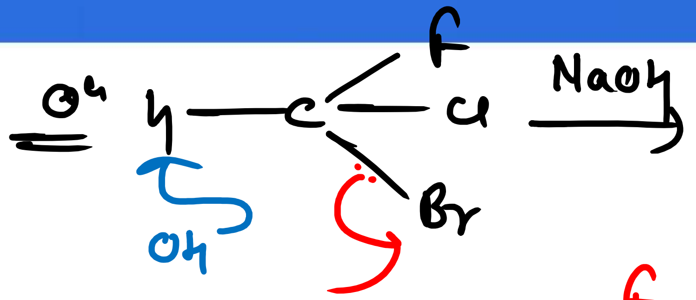



Cl
CH_2N_2
(Excess)
P
Δ
Q
$CH_2—N_2$
N_2^+
CH
$CH_2—N_2$
$CH—\overset{+}{N}\equiv N$


3 From Tosyl azide (TsN3)
Ts—N=N=N
TsN3
K2CO3
H
I
II

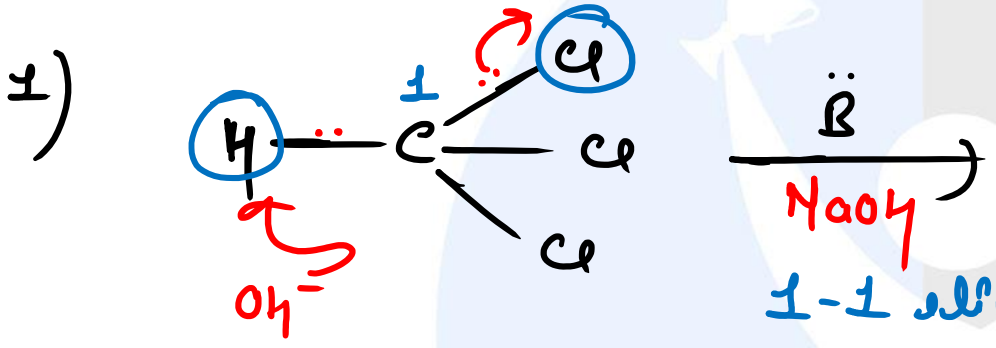
4) From haloalkanes

$CHCl_3$

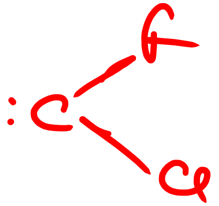


Trihalo compound

1)



Carbene

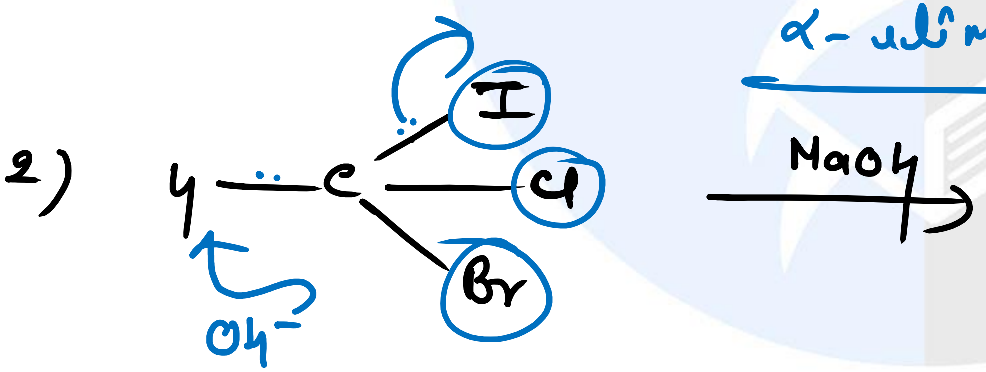


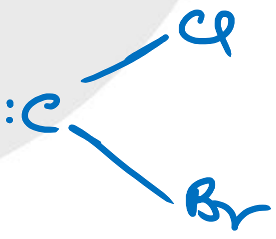
1-1 elimination

OR

α-elimination

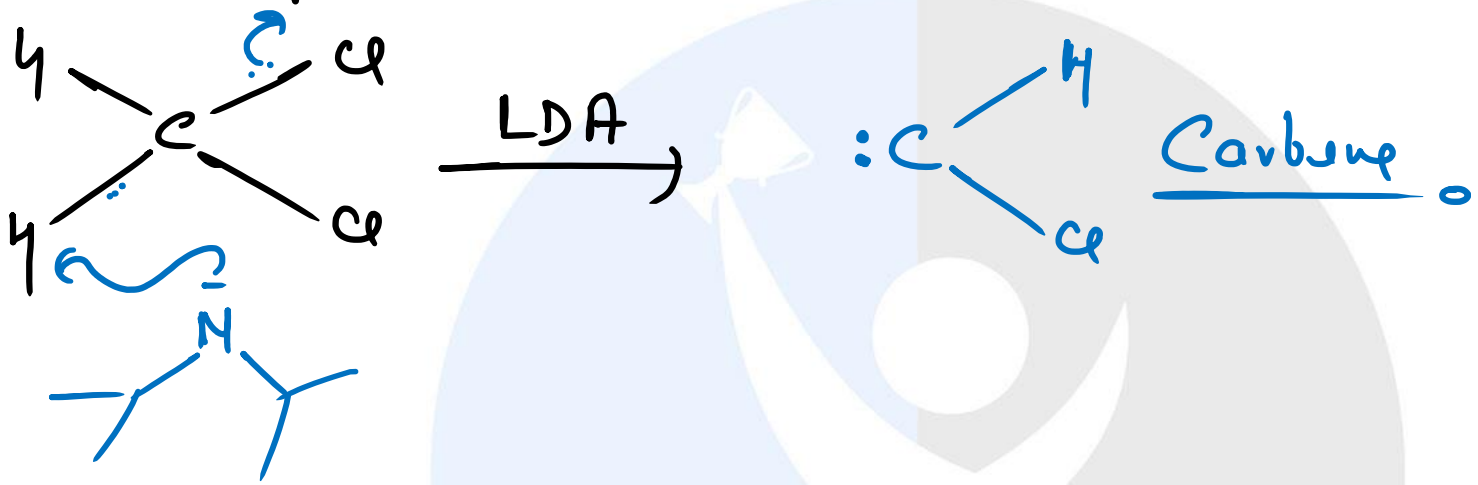
2)



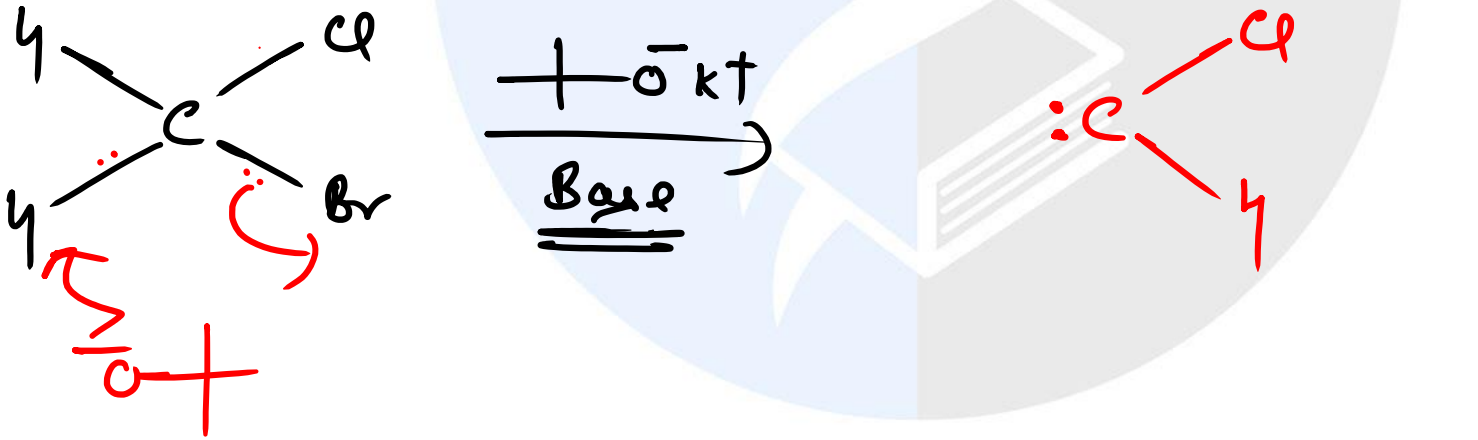


Dihalo compounds.

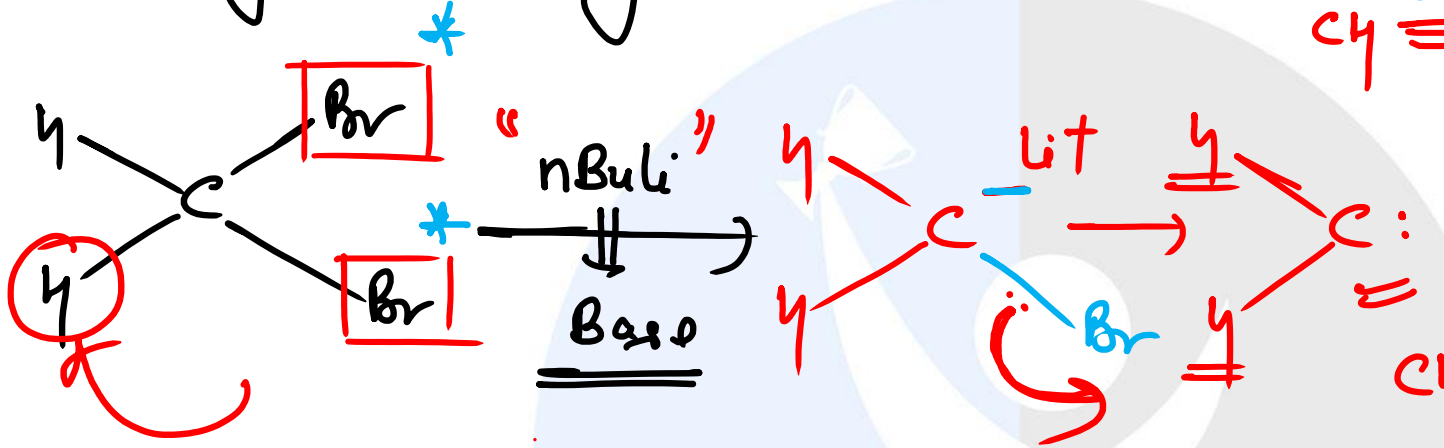
1)

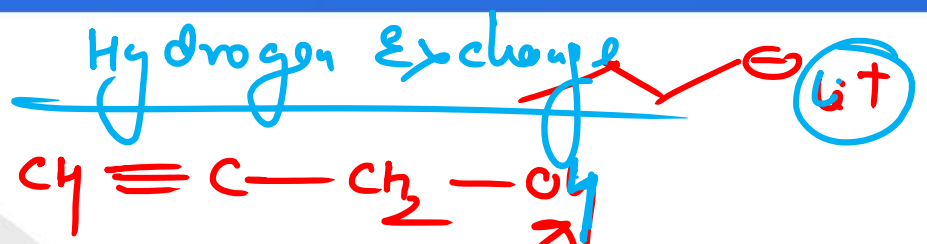


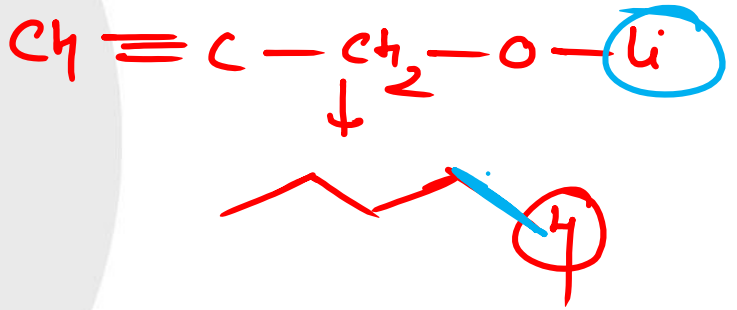
2)



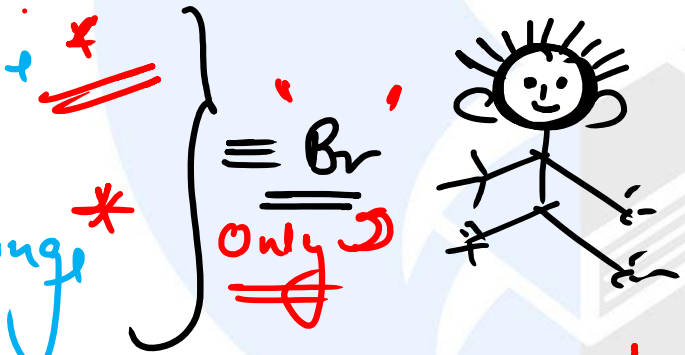
Halogen exchange Reactions.

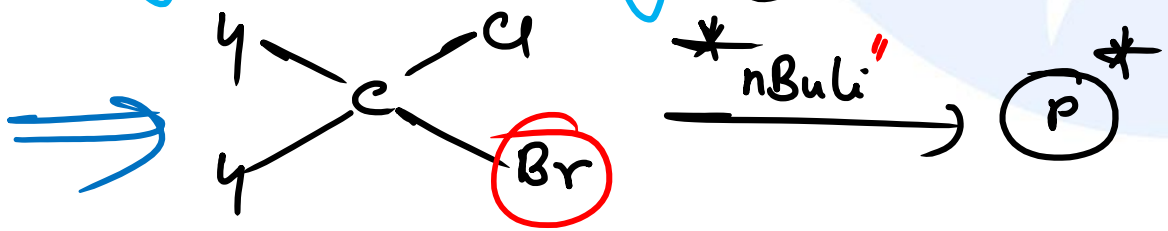


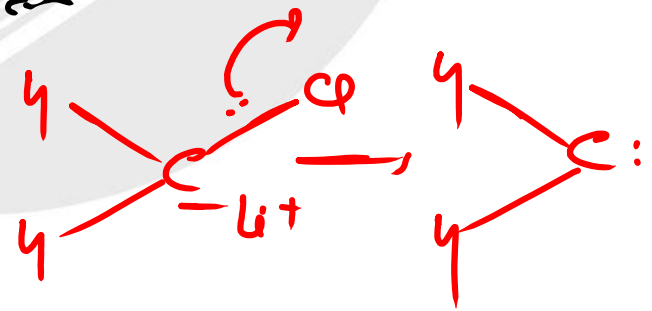


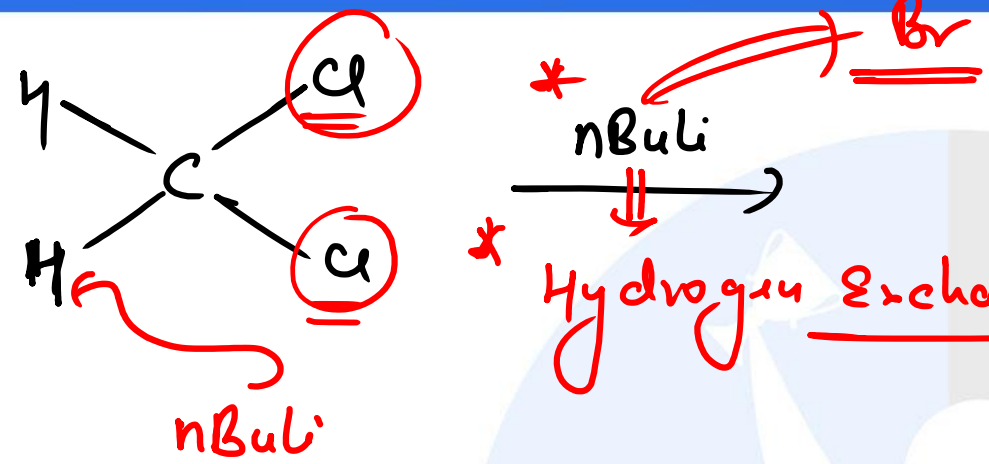


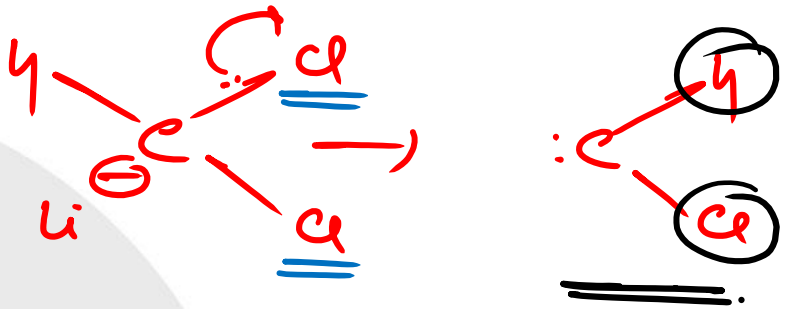
Halogen Exchange (fast) > Hydrogen Exchange



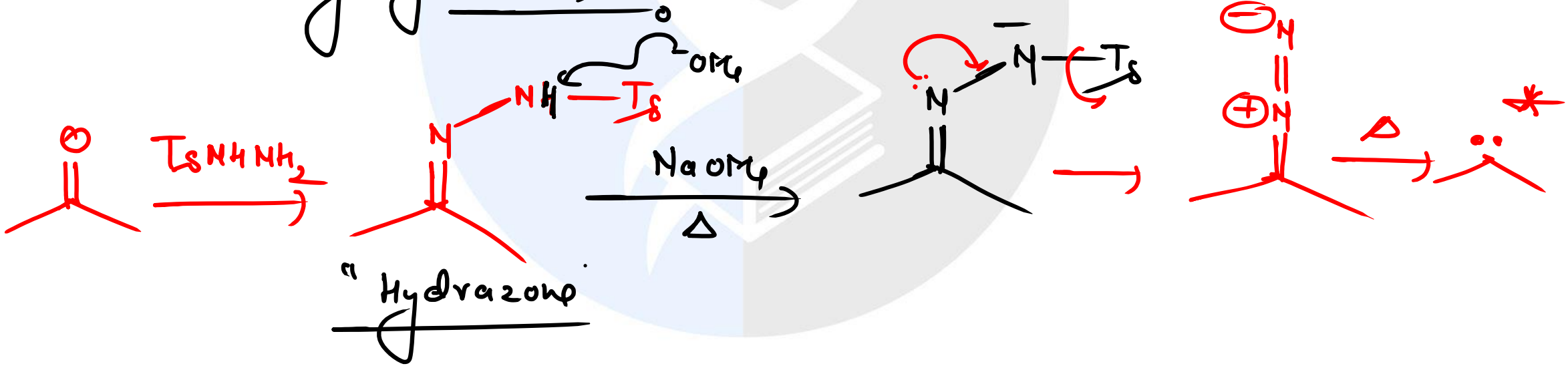


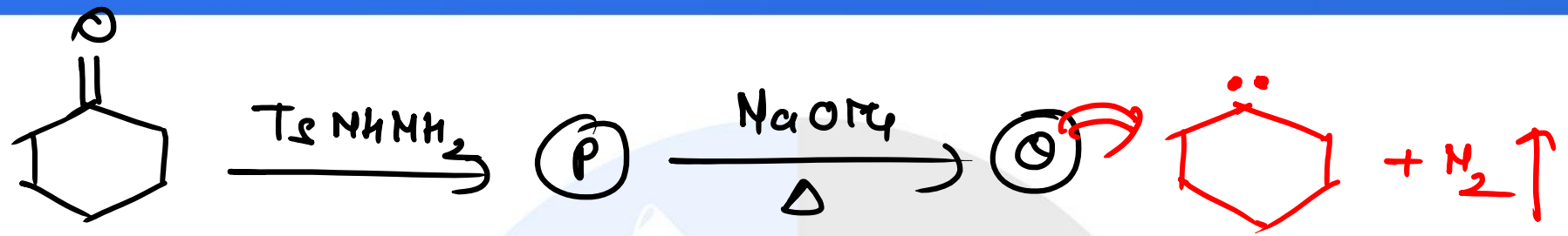




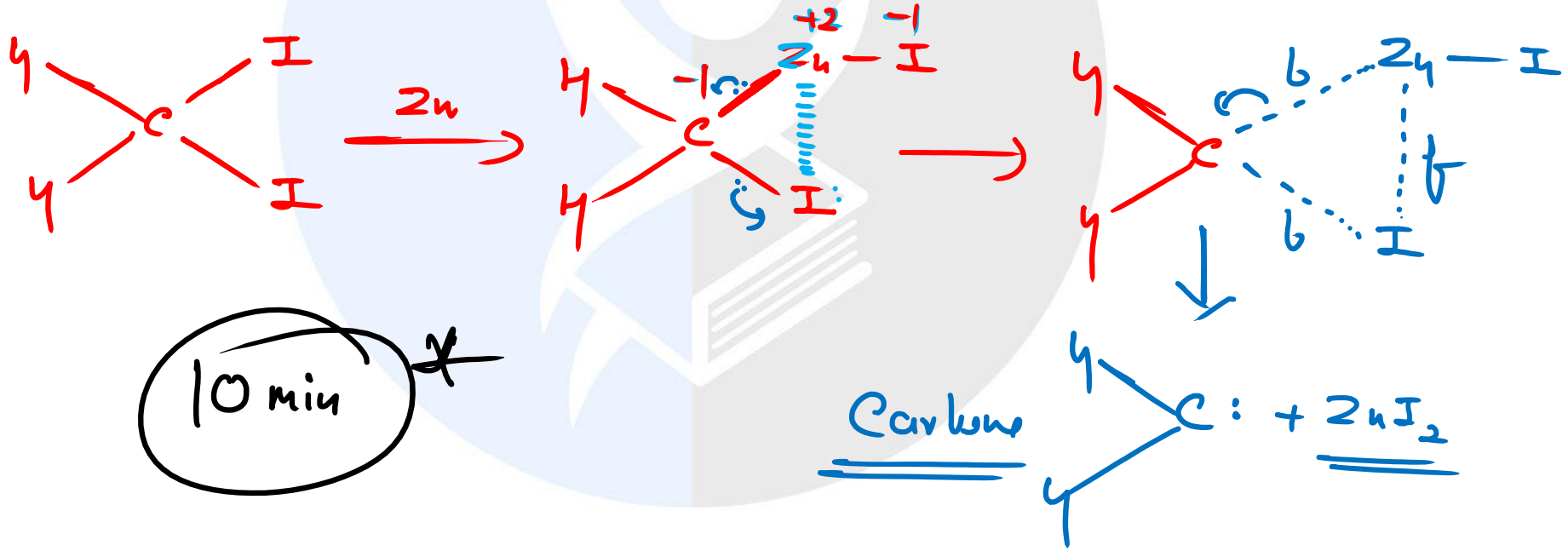


(5) From Tosylhydrazones



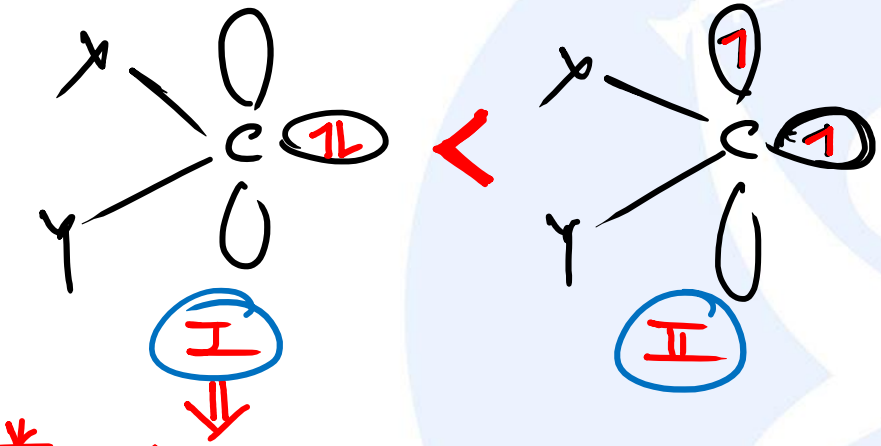


(6) From "$CH_2I_2/Zn-Cu$"

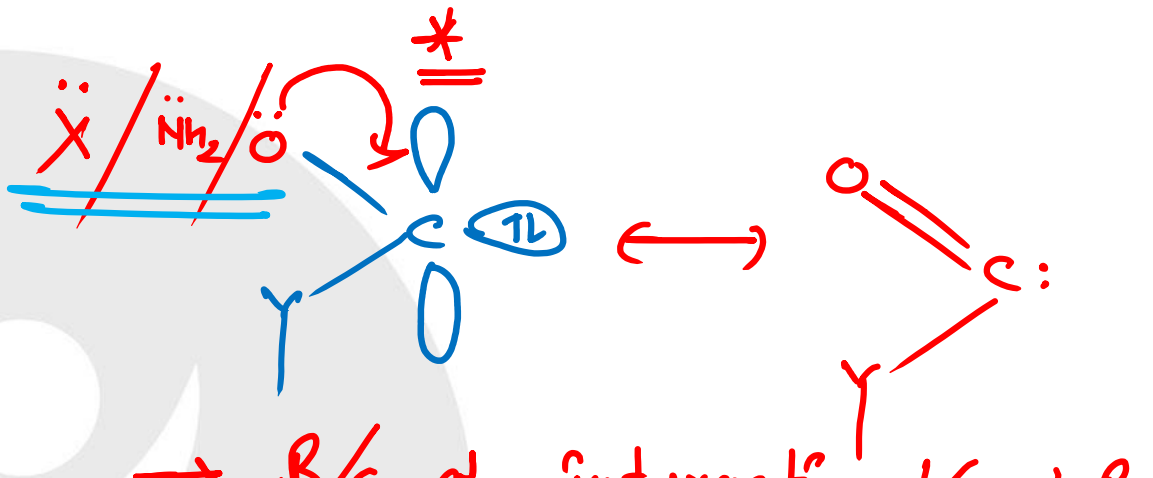


10 min

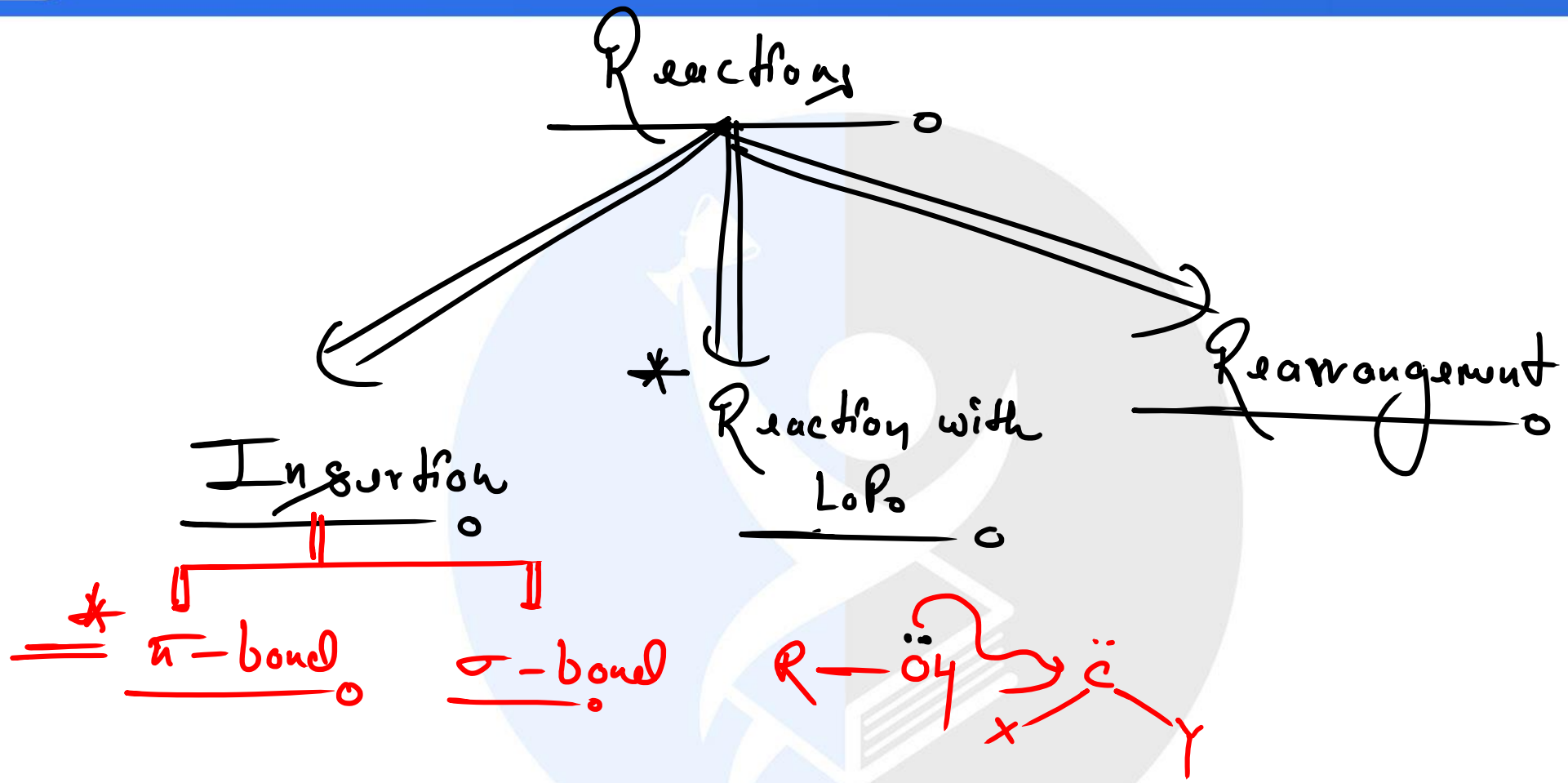
Singlet v/s Triplet :



* B/c of Inductive electronic repulsion they are little unstable.

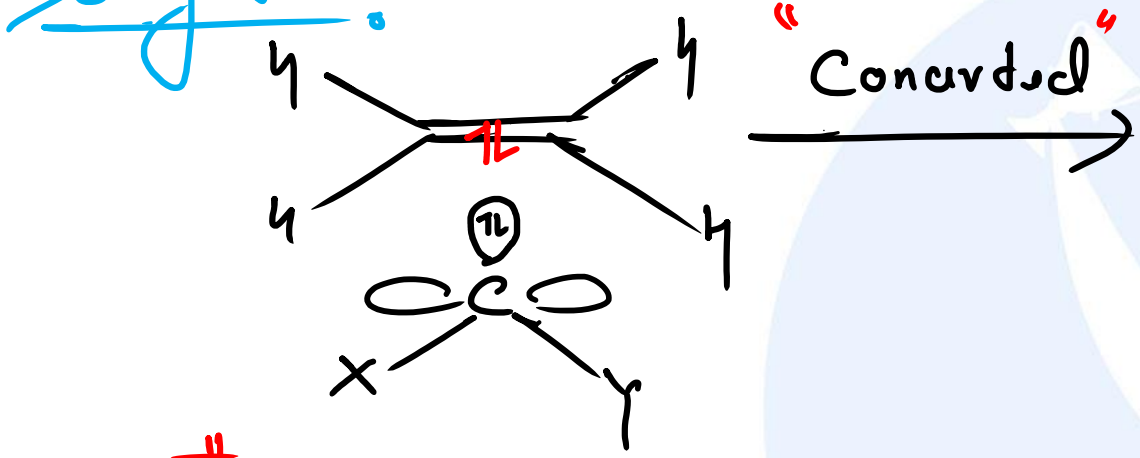


⇒ B/c of interaction b/w LoPe and vacant orbital singlet carbene is stable.

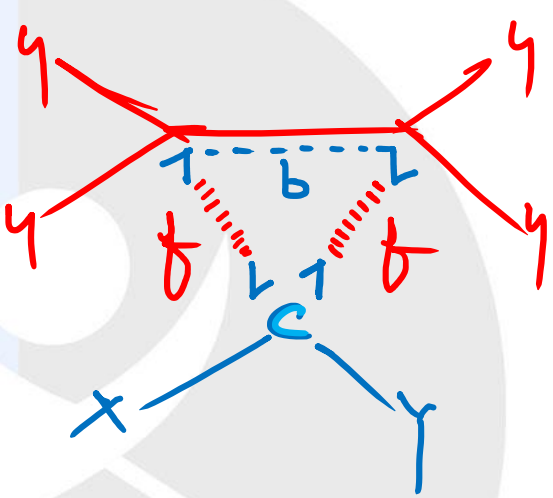

Reaction
Rearrangement
Reaction with LoPo
Insertion
π-bond
σ-bond
R—O
X
Y

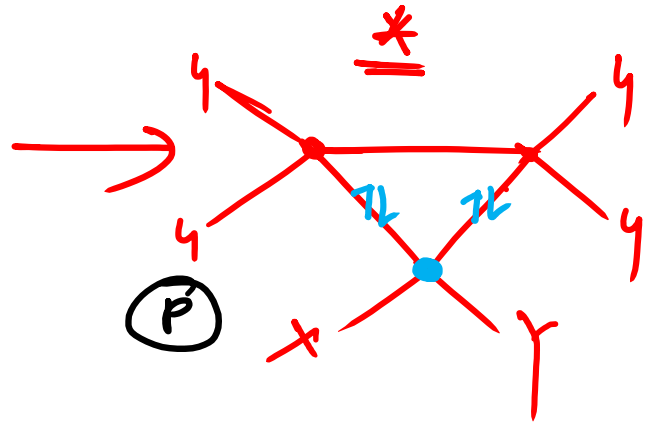
(1) π - Insertion of Carbene.

Singlet.



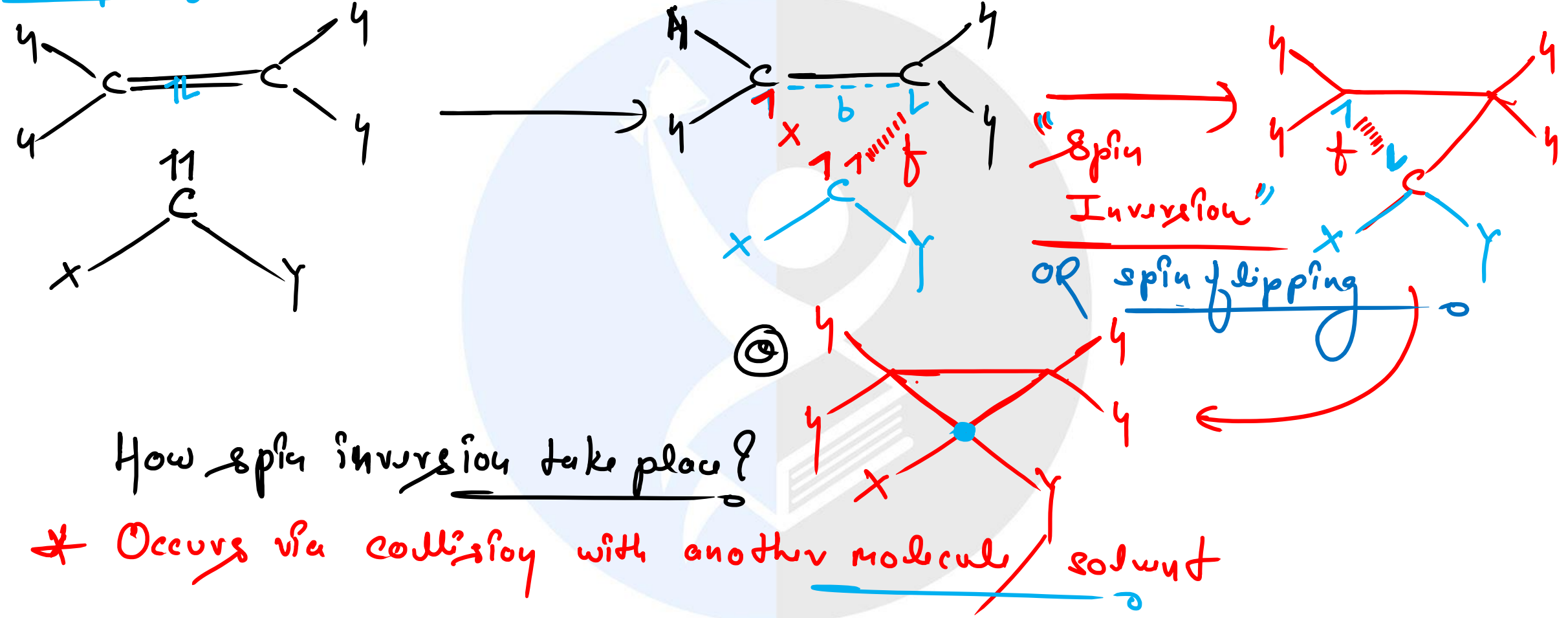
"Concerted"





Or $^{\#}$ $\begin{cases} sp^2 H_o O_o \rightarrow \pi^* \\ \pi \rightarrow p\text{-orbital} \end{cases}$

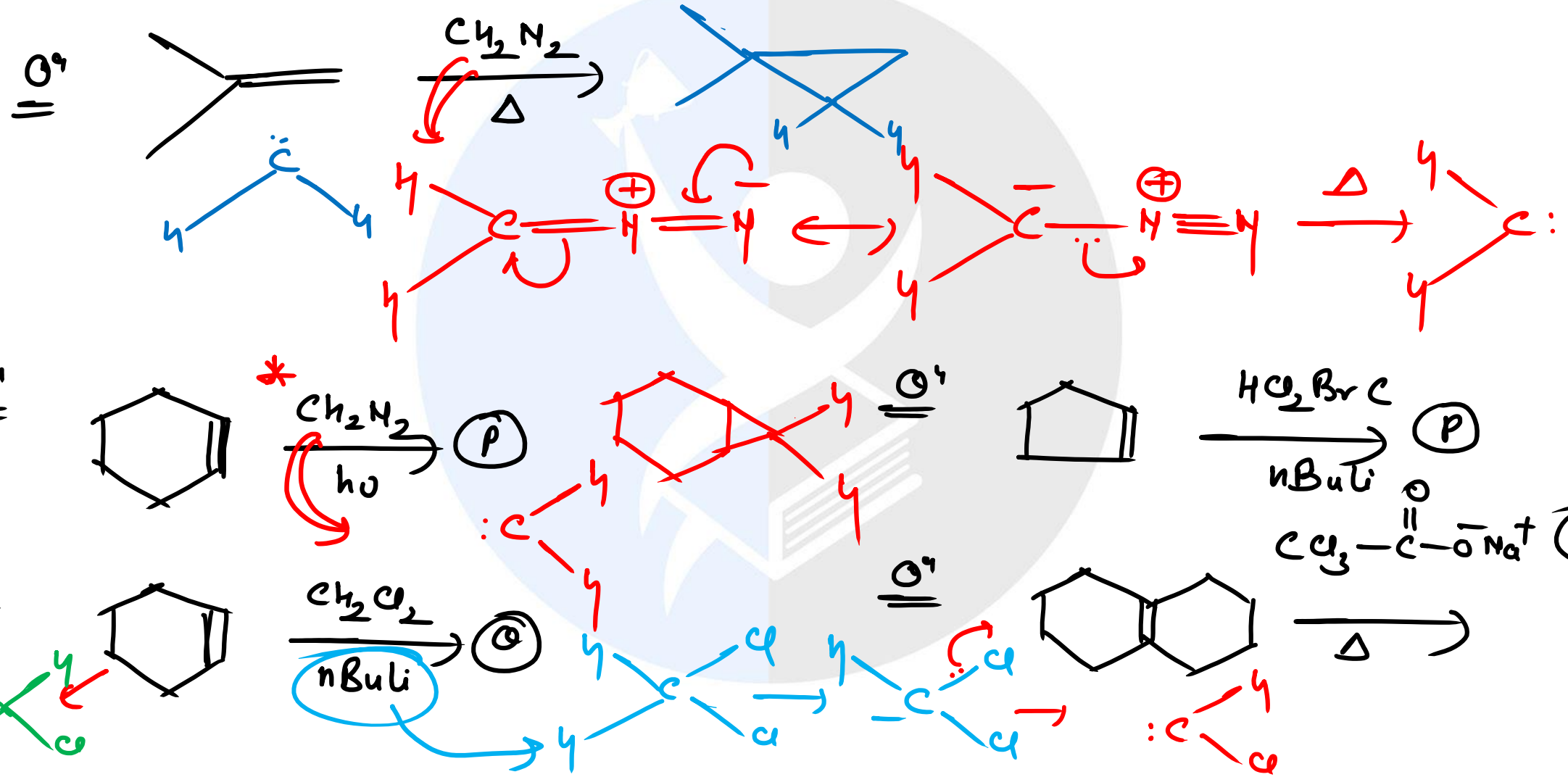
Triplet.

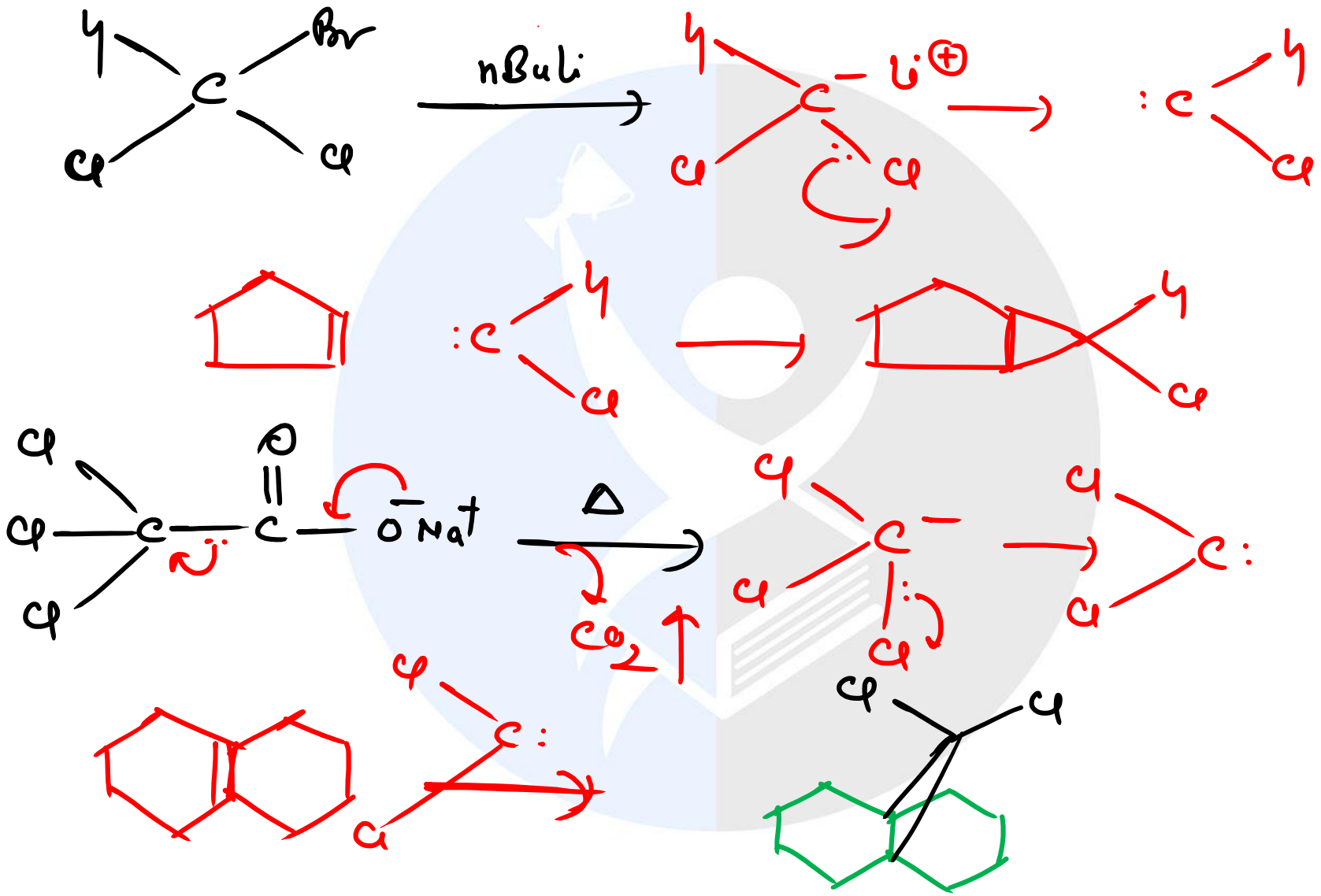


How spin inversion take place?

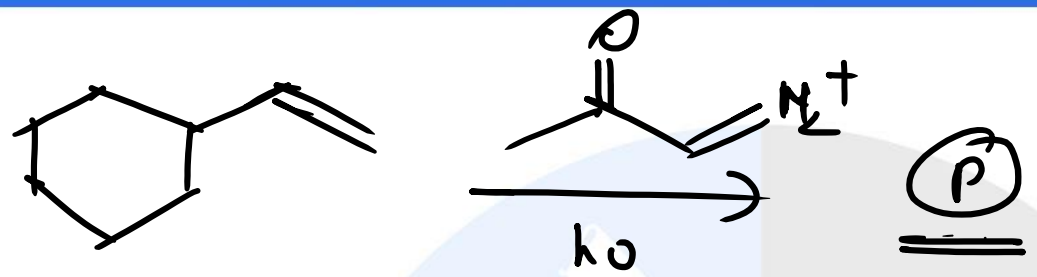
* Occurs via collision with another molecule/ solvent

Level - (1)




nBuLi
Δ
CO_2

Q.



"How?"

"Thank you"