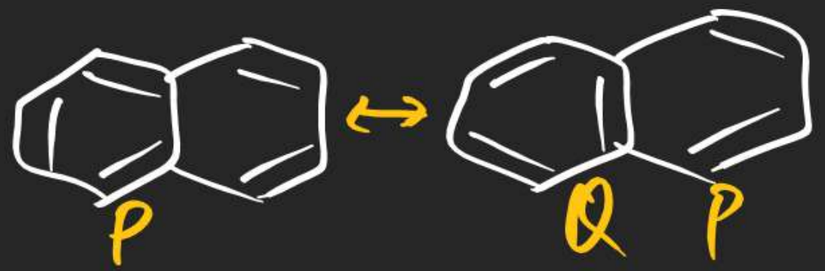
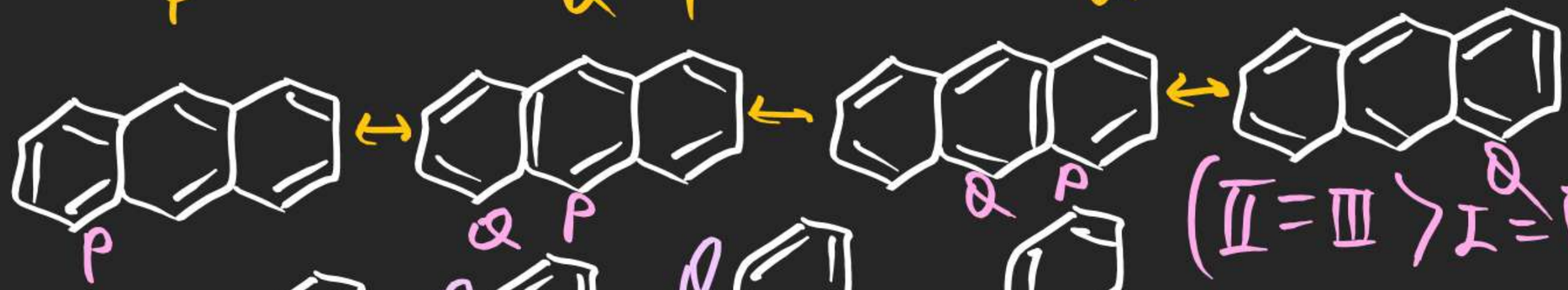
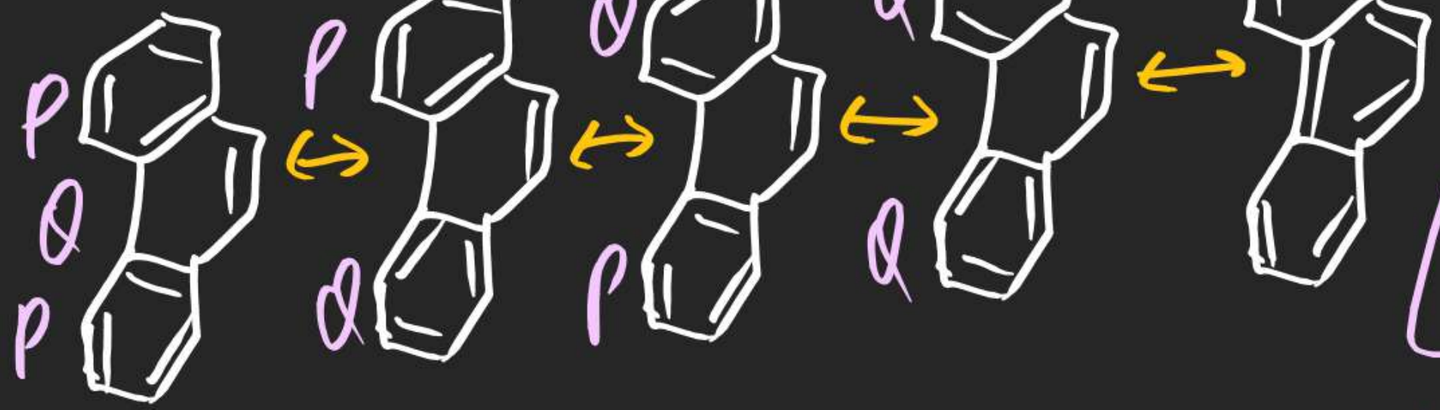
(5) RS having higher no of Benzenoid segment is more stable.

(9)  (I = II)

(10)   [II > I = III]

(11)  (II = III > I = IV)

(12) 

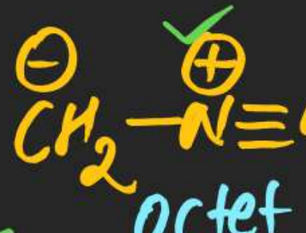
I > II = III = IV > V

IIT Adv

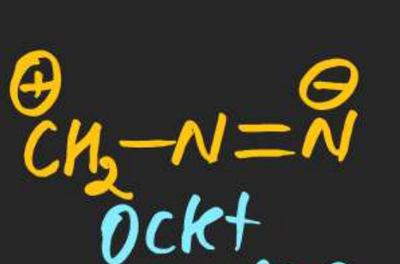
(13)

Octet Comp

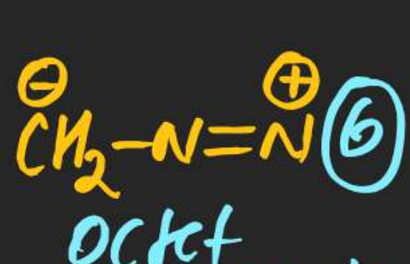
Rule-1 ✓
Rule-2 ✗
Rule-3 ✓



Octet Comp



Octet Incomp

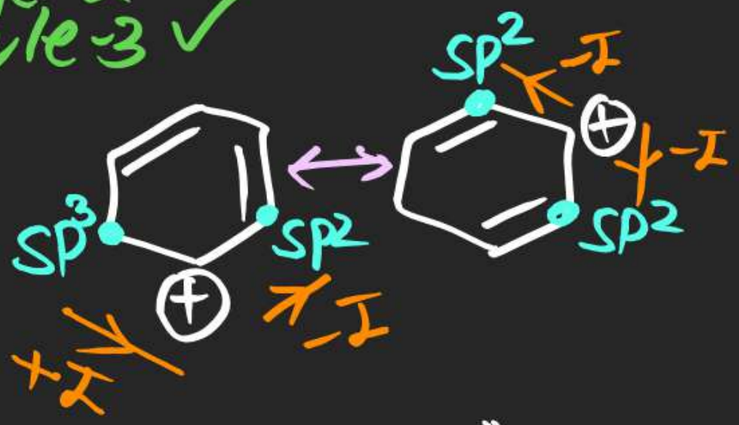


Octet Incomple

Rule-2 ✗
Rule-3 ✓

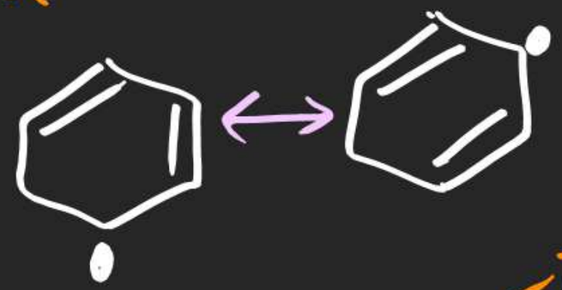
I > II > III > IV

(14)



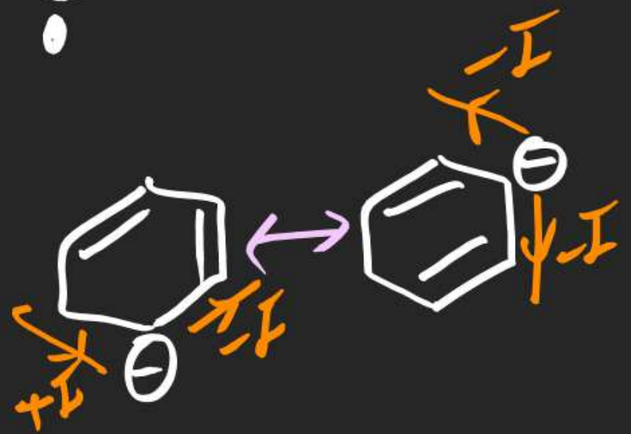
I > II

(15)



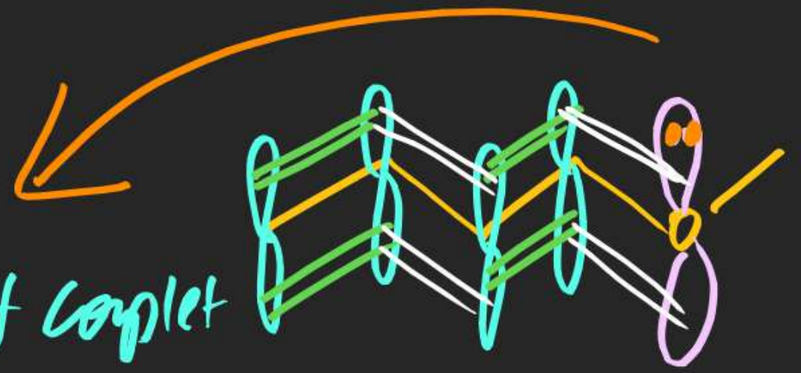
I > II

(16)



I < II

Ad: PYQ (17) JIT



octet complet

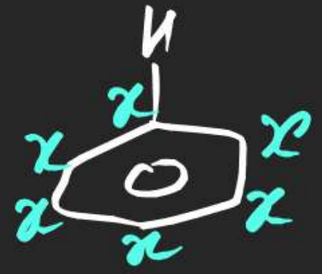
octet complet

least stable RS

octet incomplete

I > II > III > IV

Resonance / Mesomeric Effect :-

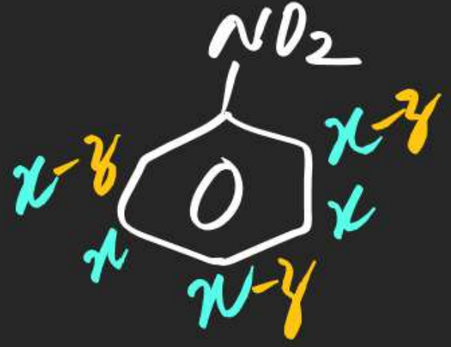


Resonance ✓

Resonance effect

✓

Resonance effect of NH_2
(Electron donating)

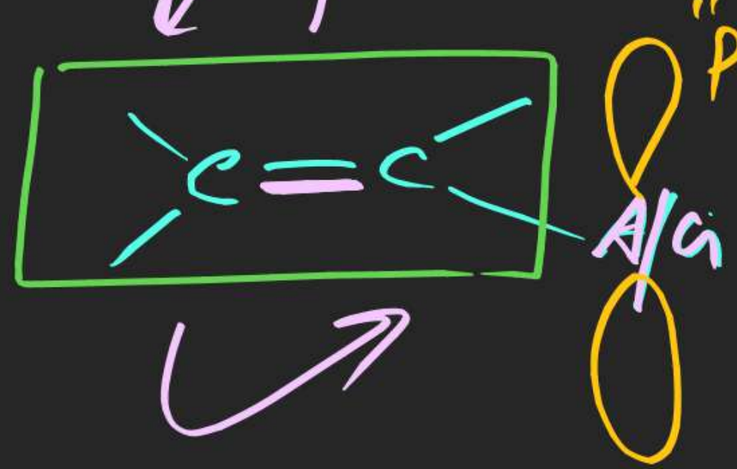


✓

Resonance effect of NO_2
(Electron withdrawing)

Resonance/Mesomeric Effect (R/M effect)

Permanent displacement of of π e^- density due to p abital of directly attached A/G is known as R/M effect of that A/G on conjugated system.



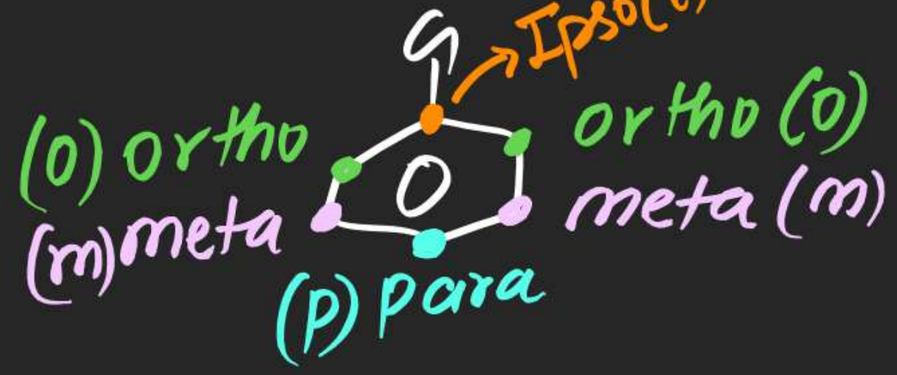
Note (i) Permanent effect

(ii) Distance independent effect

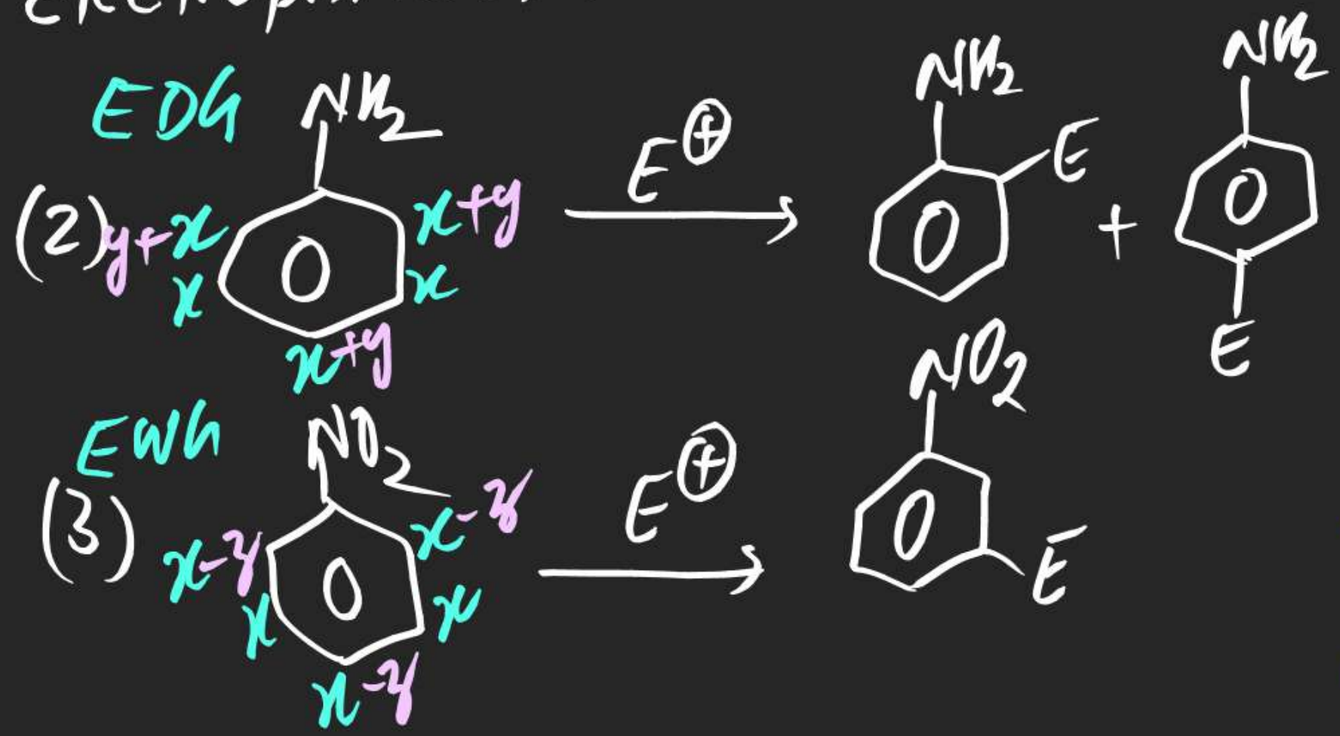
(iii)

(Electrophilic Substitution Rxn)

(iv) In Substituted Benzene



(v) Electrophilic Aromatic Substitution



देने वाला देता है तो
ortho & para पर देता है.
Hence ortho & para directing

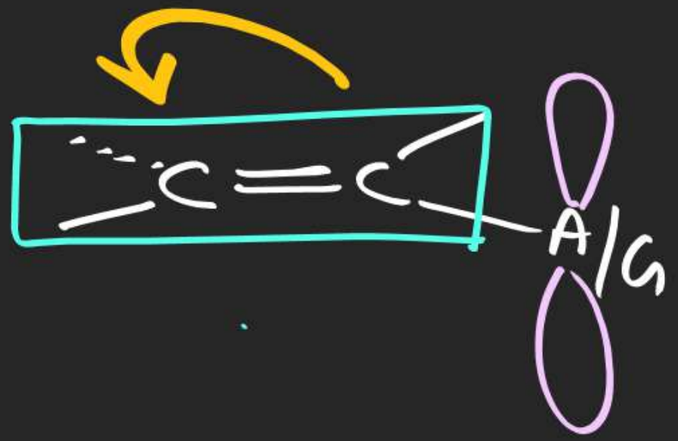
लेने वाला लेता है तो
ortho & para से ही लेता है
hence meta directing.

Type of Resonance effect:

⇒ There are two type of Resonance effect.

(i) +Resonance / + mesomeric effect :- Permant polarisation of $\pi\bar{e}$ density due to "p" orbital of attached A/G away to itself is known as +R/+m effect of A/G

(+R / +m) effect

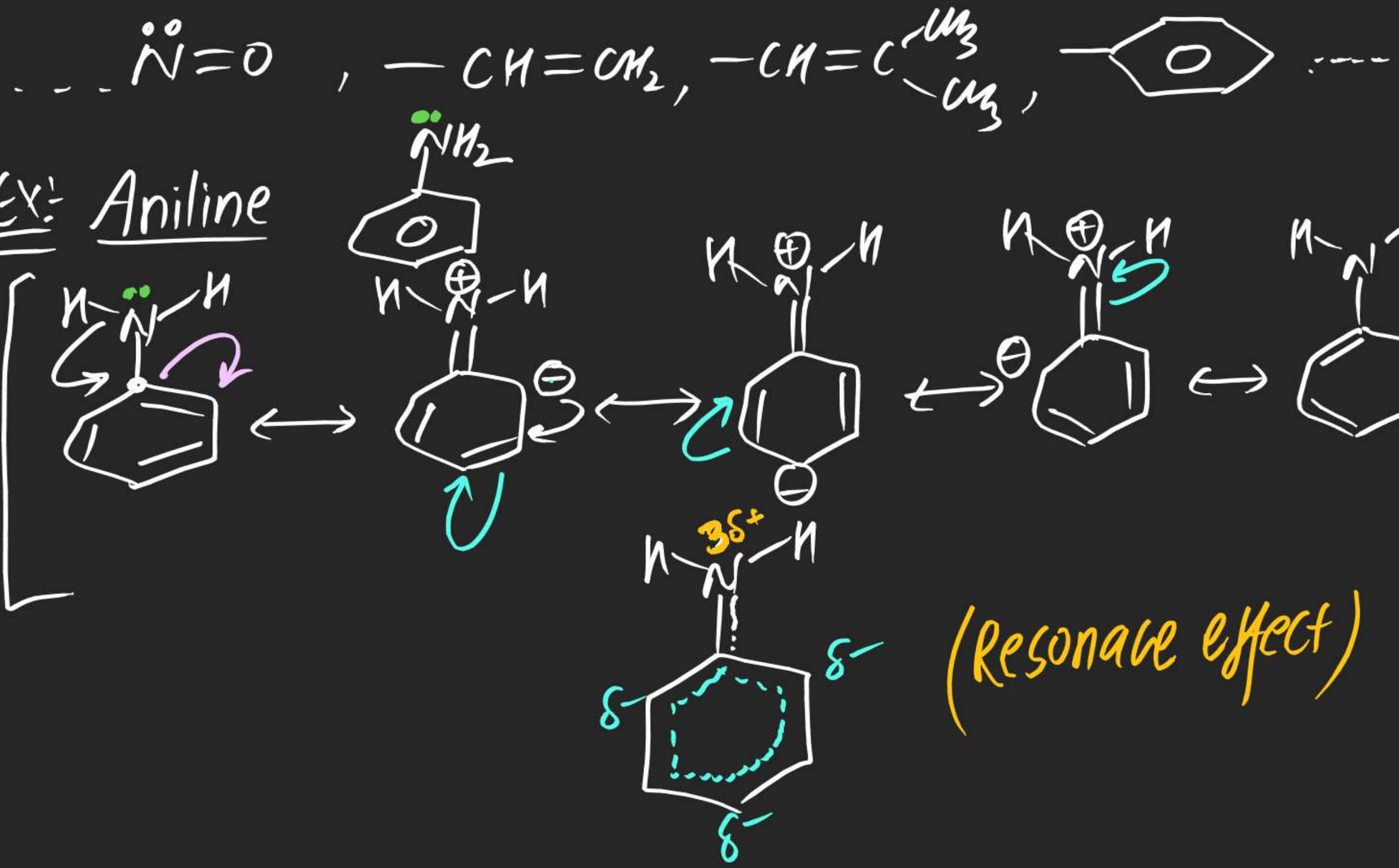


"p" orbital

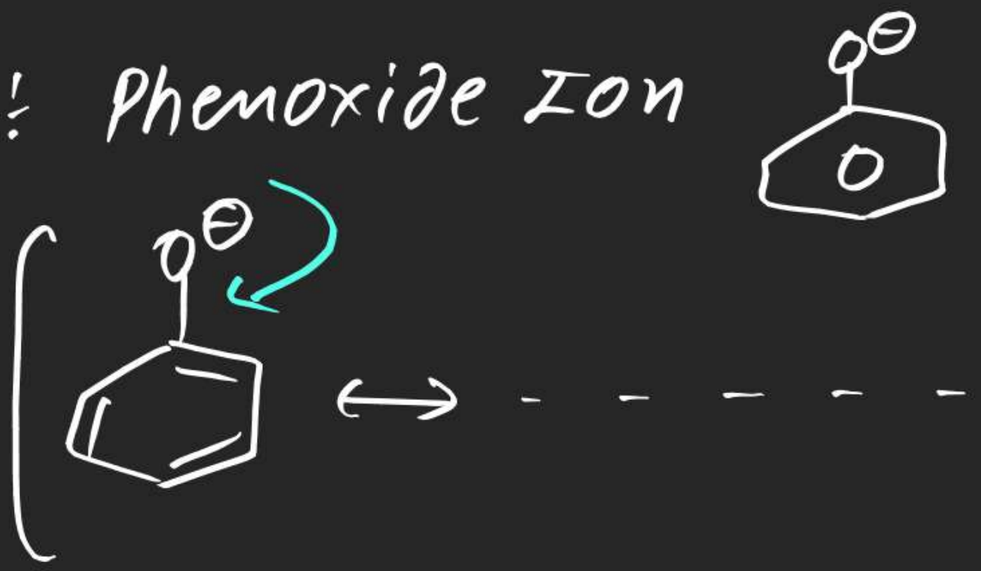
Note (i) +R/+m effect is Electron donating effect

(ii) A/G which can show +R effect $-\ddot{F}:$, $-\ddot{Cl}$, $-\ddot{Br}$, $-\ddot{I}$, $-OH$, $-OR$, $-NH_2$

$-\ddot{N}H-\overset{\overset{O}{\|}}{C}-CH_3$, $-NHR$, $-NR_2$, $-\ddot{O}^{\ominus}$, $-\ddot{N}H^{\ominus}$, $-CH_2^{\ominus}$, $-\ddot{O}-\overset{\overset{O}{\|}}{C}-CH_3$


Ex: Aniline
Total "5" (RS)
(Resonance effect)

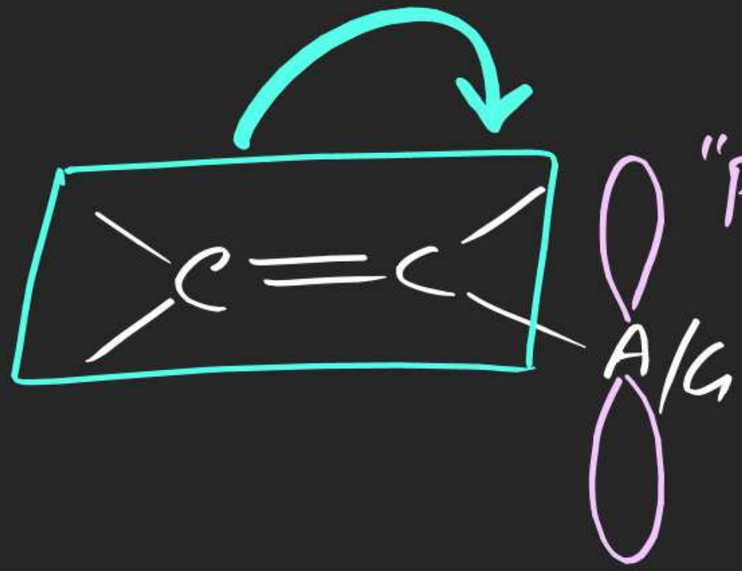
Ex! Phenoxide Ion



Note +R series

(#) - Resonance / - mesomeric effect (-R/-M effect):-

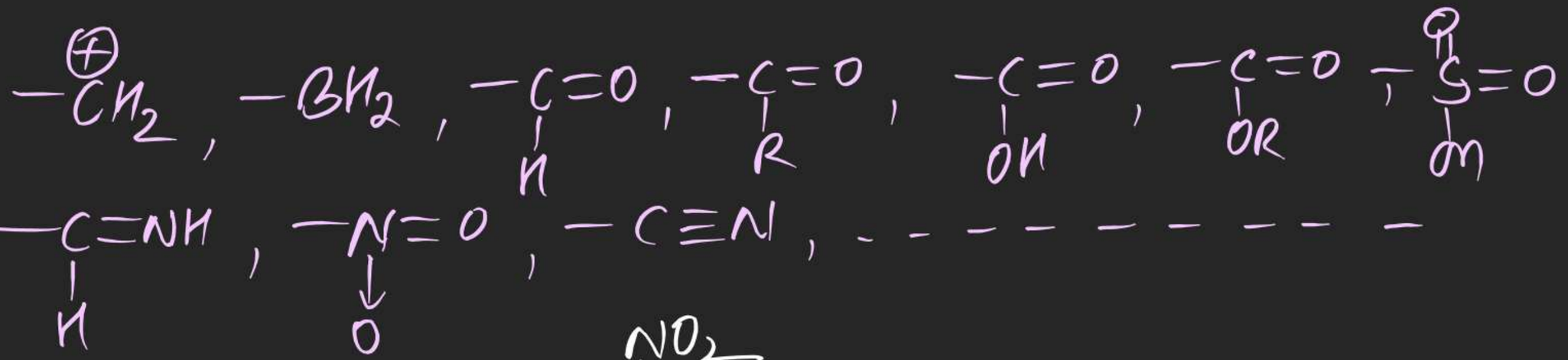
Permanent displacement of π e^- density toward attached A/G due to its "p" orbital are known as -R/-M effect of A/G



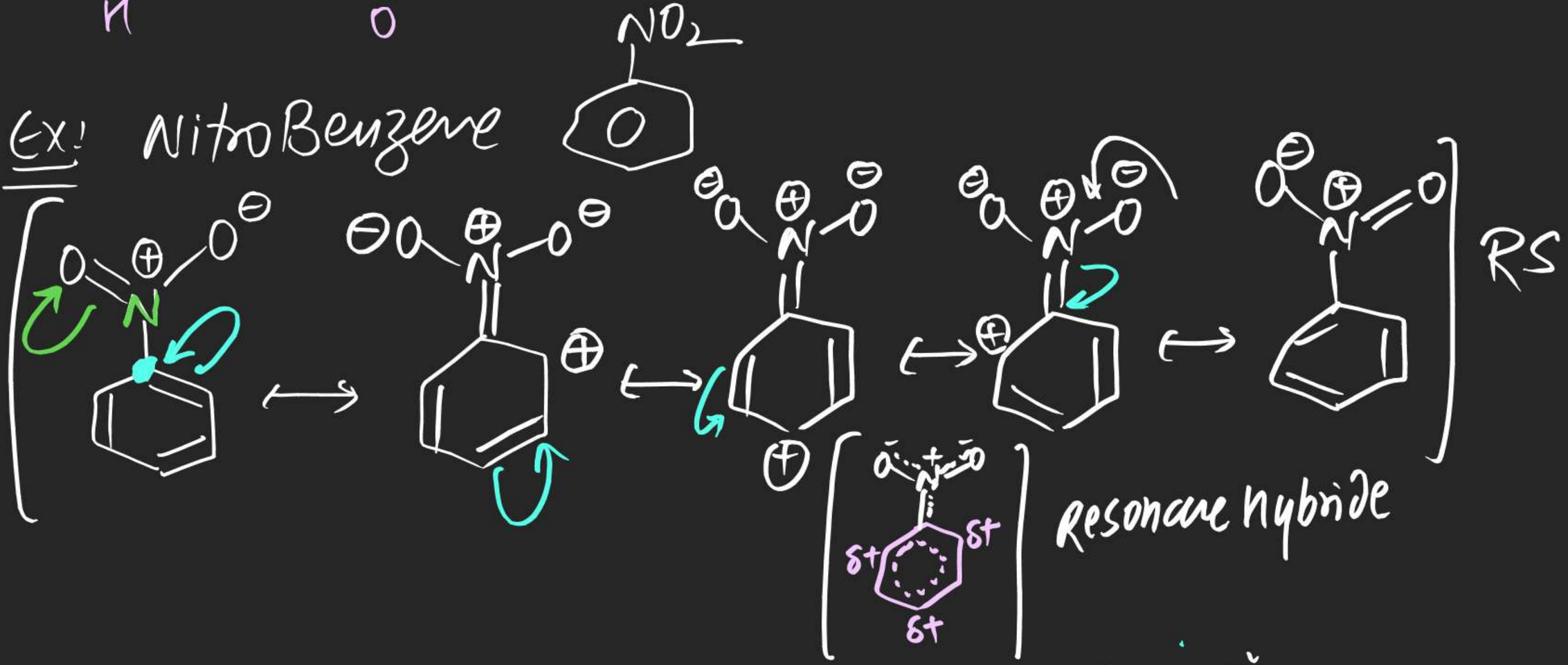
Note (i) -R/-M effect is e^- withdrawing effect

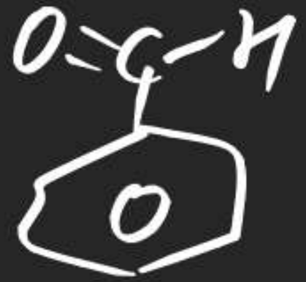
(ii) -R/-M effect is shown by groups having either exactly vacant orbital or may be vacant (polarised Bonds)

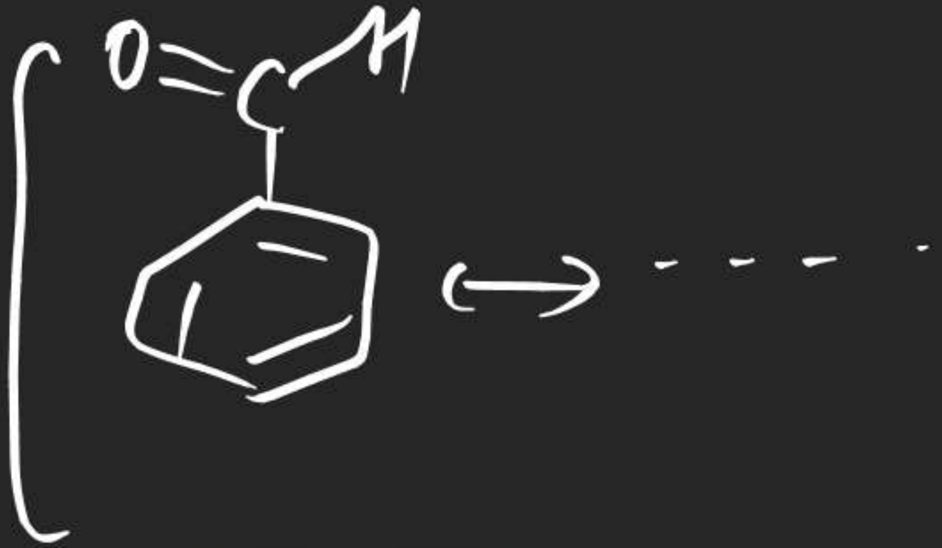
$A=B$
$A\equiv B$
$\Big]\ E_B > E_A$



Ex: Nitrobenzene



Ex:- Benzaldehyde 



-R series :-

⟹ Order of Rate of electrophilic attack.

Activating Compounds: All compounds which show higher rate of electrophilic substitution than Rate of electrophilic substitution of Benzene, are known as Activating Compounds.

Highly Activating Groups

$-NR_2$, $-NHR$, $-NH_2$, $-OH$, $-O^{\ominus}$

$-CH_2$, $-OR$

+R

Moderately Activating Groups

$-\ddot{N}H-\overset{\overset{O}{\|}}{C}-CH_3$ / $-\ddot{O}-\overset{\overset{O}{\|}}{C}-CH_3$

+R

Weakly Activating Group

$-CH_3$, $-CH_2-CH_3$, $-CH(CH_3)_2$, $-C(CH_3)_3$

+H / +I

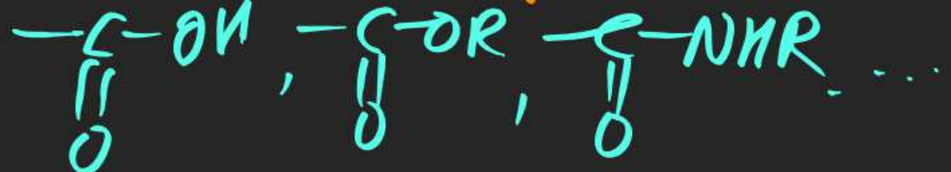
Deactivating Compounds All Compounds which show slower rate of electrophilic substitution than Benzene, known as Deactivating Compounds.

Weakly deactivating Groups

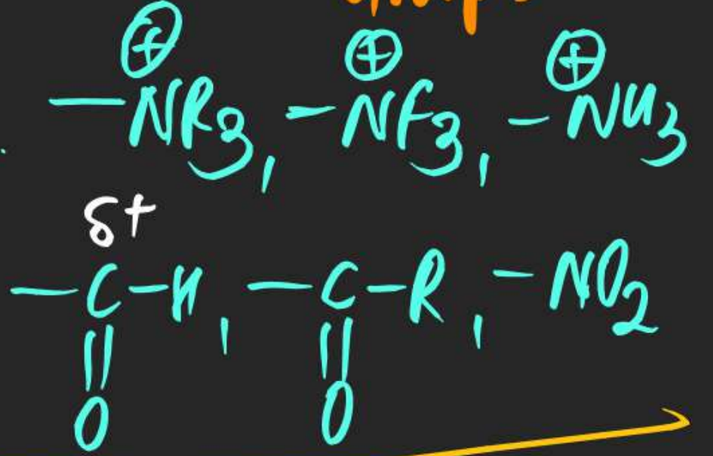
halogens

+R

moderately deactivating Groups



Strongly deactivating Groups.



-R

Note: