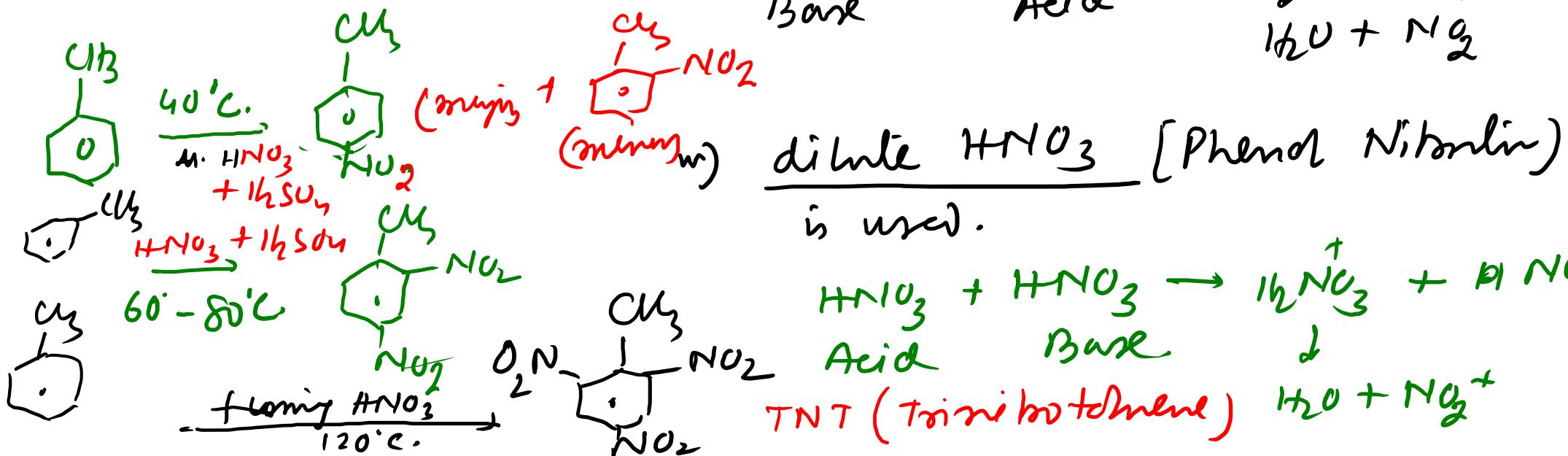
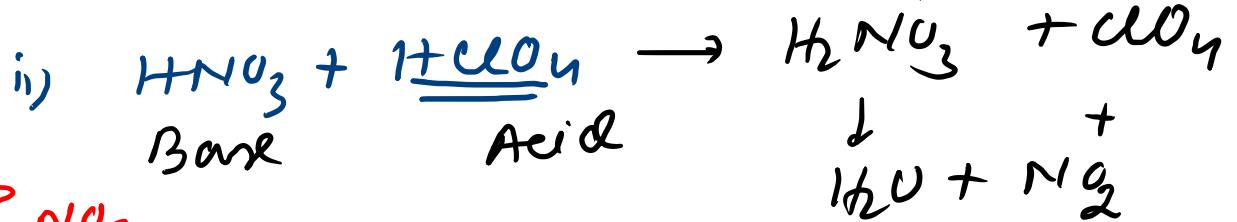
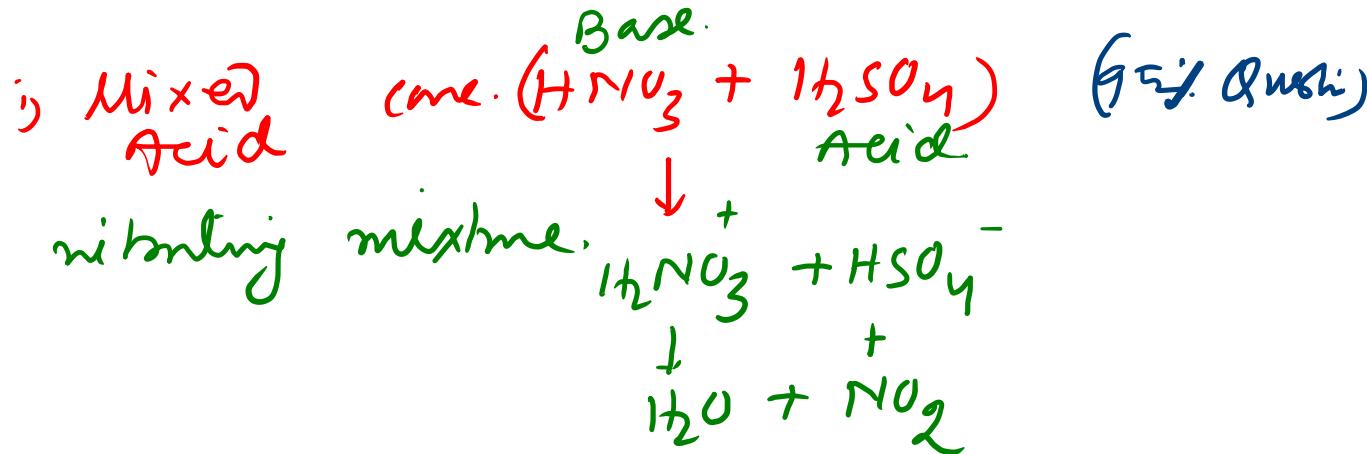


Different types of electrophilic substitution:

- ⇒ Nitration ($E^+ \Rightarrow NO_2^+$)
- ⇒ Halogenation ($E^+ \Rightarrow X^+ ; Cl^+ ; Br^+ ; I^+$)  $\xrightarrow{E^+}$ 
(F⁺ is very unstable)
- ⇒ Acylation (Friedel-Crafts) ($E^+ \Rightarrow R^+$)
- ⇒ Acylation (Friedel-Crafts) $[E^+ \Rightarrow R-\text{C}_6^+]$ ⇒ Nitrosation.
 $[E^+ \Rightarrow NO^+]$
- ⇒ Sulphonation. $[E^+ \Rightarrow SO_3^-]$.
- ⇒ Formylation. $[E^+ \Rightarrow H-\text{C}_6^+]$  \rightarrow 
- ⇒ Gatterman Koch Reaction
- ⇒ Gatterman Aldehyde Synthesis.
- ⇒ Diazo coupling. $[E^+ \Rightarrow PhN_2^+]$.
- ⇒ Chloromethylation. $[E^+ \Rightarrow Cl_2-\text{CH}_2^+]$

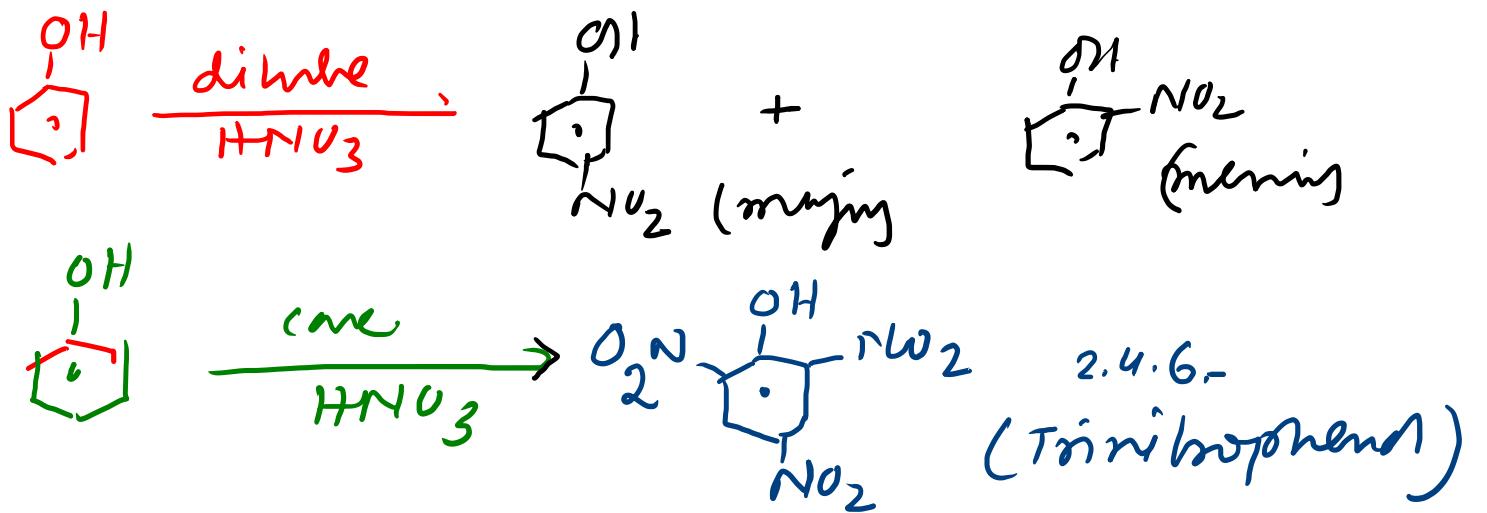


Ionic compound (salt)

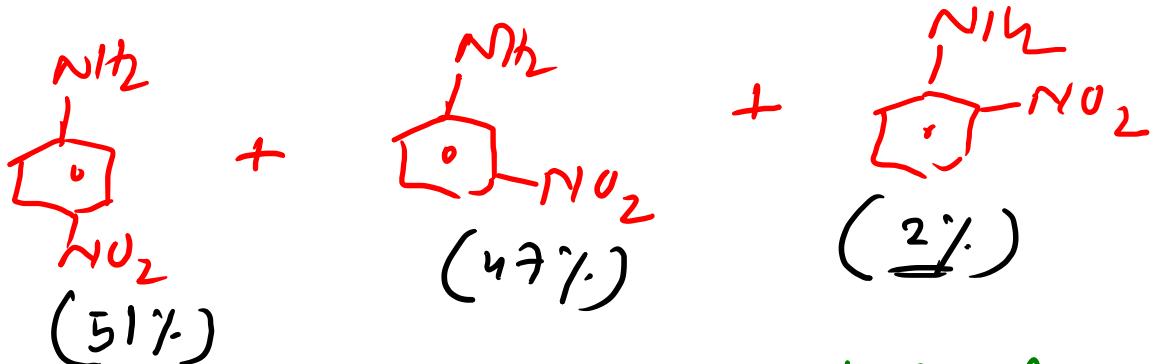
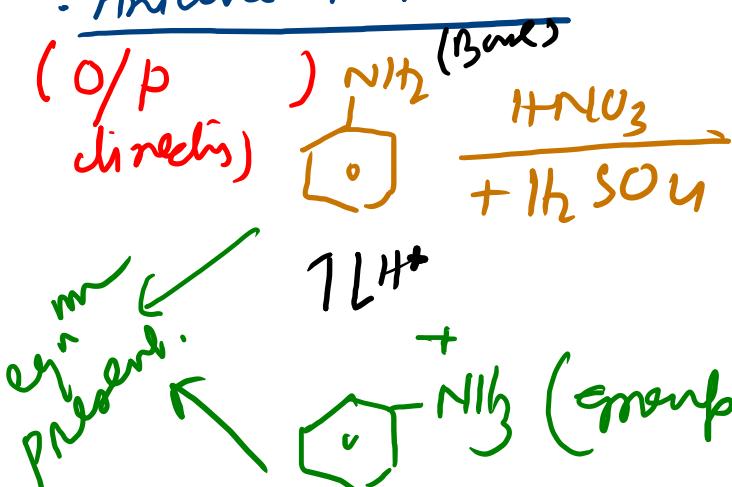


: Phenol Nitration :

To get para-nitro
aniline from aniline
some different
process is used up.

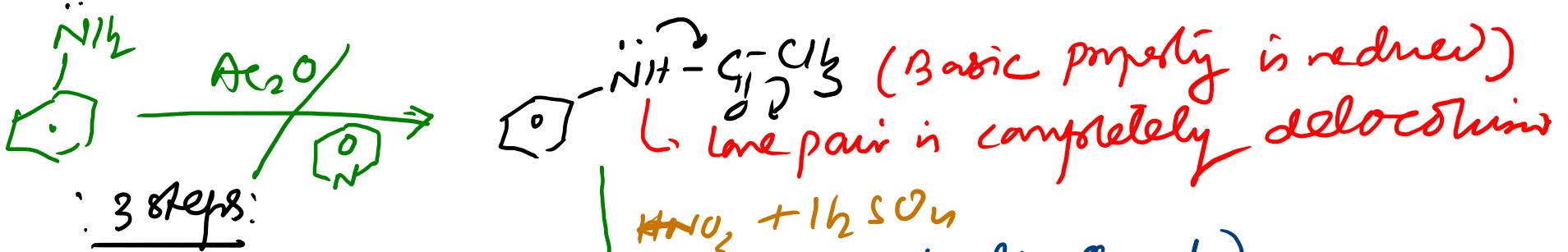


: Aniline Nitration:

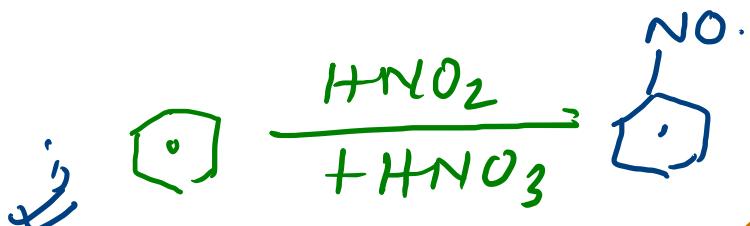
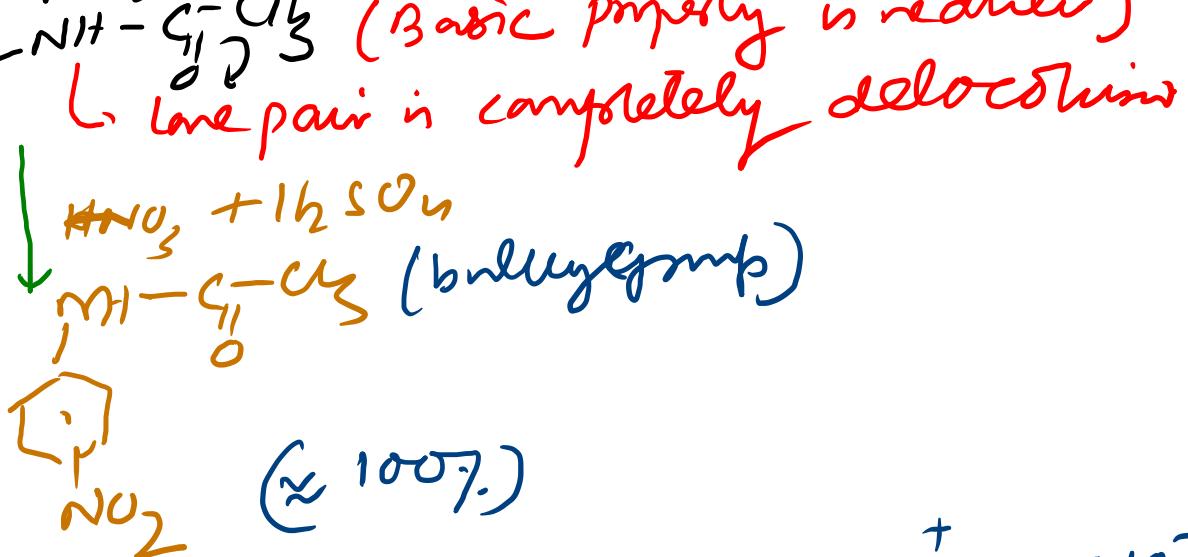
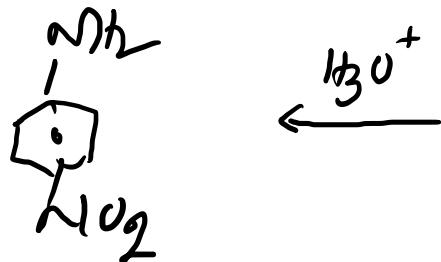


Ex: LH^+ present

Ex: NH_3 (group having only -I effect is netro directing).



- i) $\text{Ac}_2\text{O}/\text{H}_2\text{SO}_4$
- ii) Mixed acid
- iii) H_3O^+ .



Reduction is carried

out in 3 medium.

Acidic medium: $\text{Sn} + \text{Zn}/\text{Fe}/\text{Na}$
 $\text{Sn} + \text{Hg}; \text{Zn} + \text{Hg}; \text{Fe} + \text{Hg}; \text{Na} \rightarrow \text{H}_2\text{S}\text{O}_4$

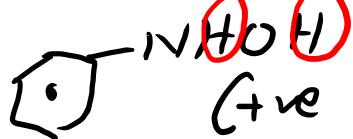
Basic medium:

Neutral medium:



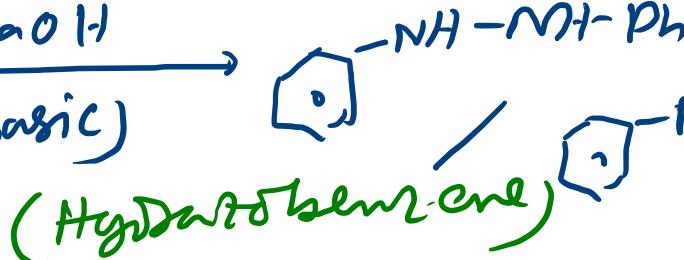
$\text{Zn} + \text{NH}_4\text{Cl}$
(neutral)

(Phenyl hydroxyl amine)



(+ve Tollens test)

$\text{Zn} + \text{NaOH}$
(Basic)



(Hydrazobenzene)



(Azobenzene)



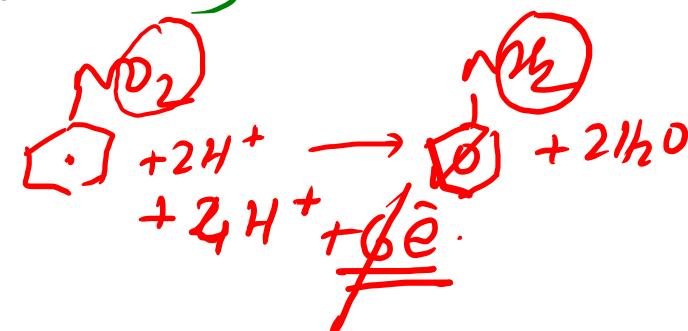
Ag mirror +



$+ 4\text{H}^+ + 2\text{H}^+$



$+ 2\text{H}_2\text{O}$.



$+ 6\text{HCl}$

$+ 3\text{Sn}$



$+ 3\text{SnCl}_2 + 2\text{H}_2\text{O}$.

(1: 6: 3)

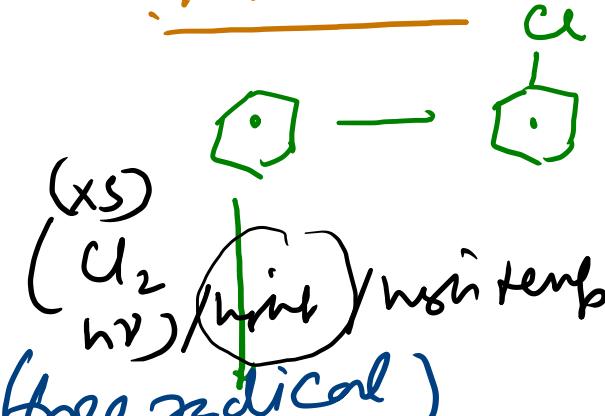
\times

2021

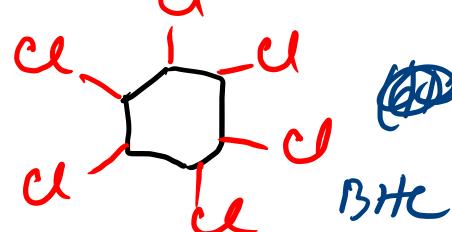
(Advanced)

$3\text{Sn} \rightarrow 3\text{Sn}^{2+} + 6e^-$

Halobenzenes:



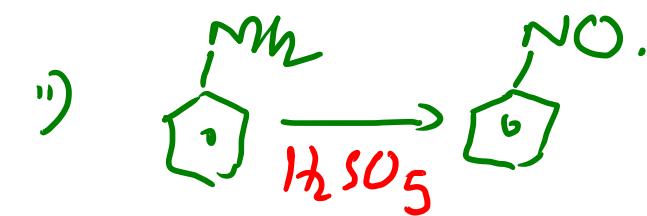
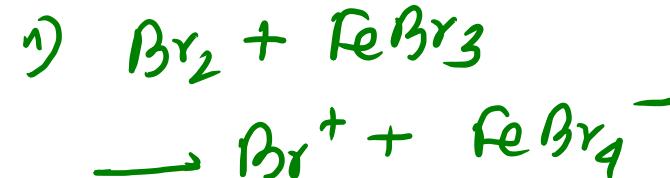
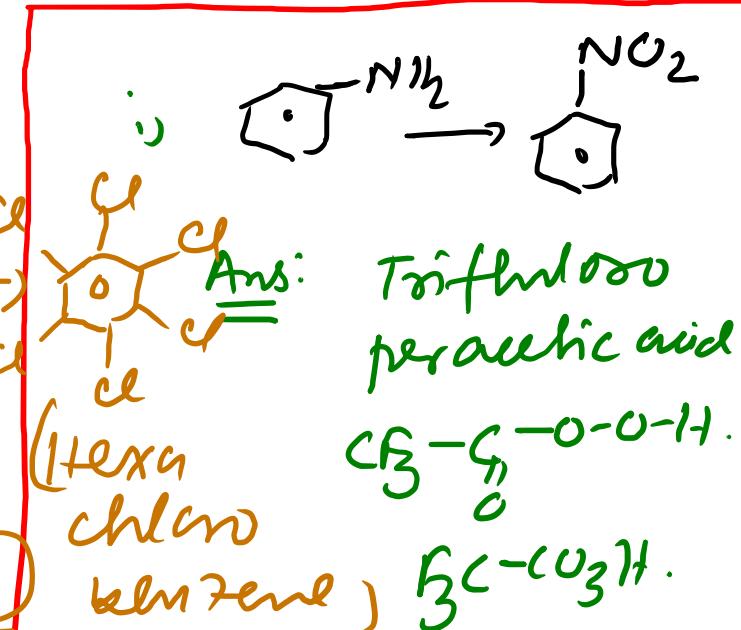
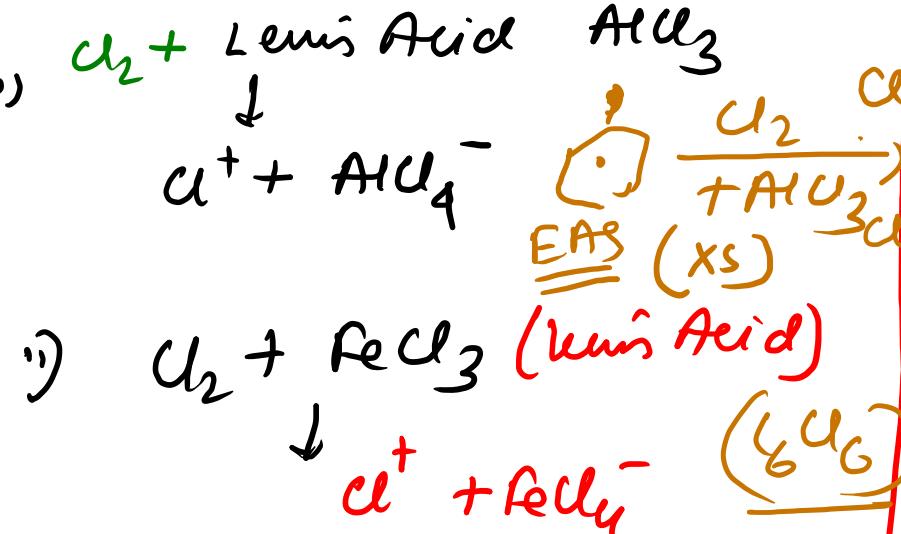
(free radical)



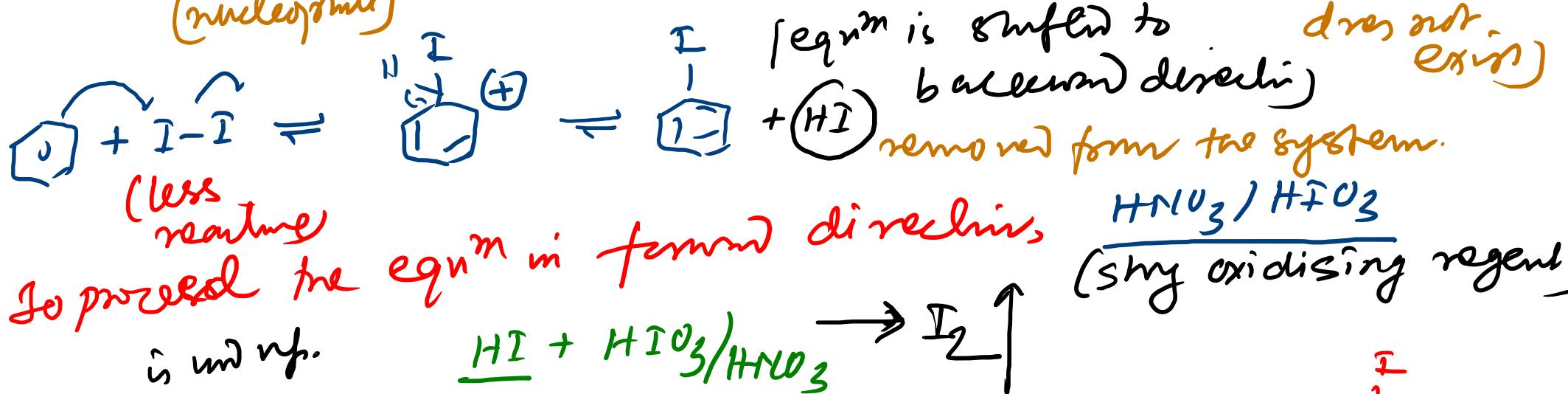
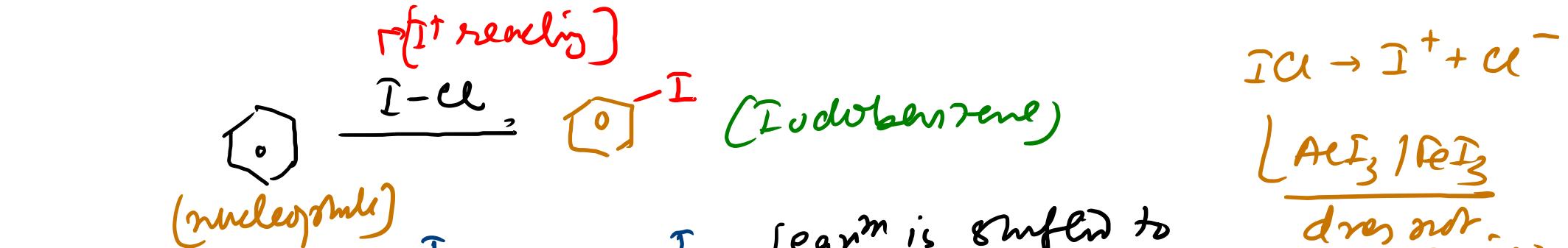
Benzene hexachloride.



Lindane. Gamma maxonow (Nonaromatic)

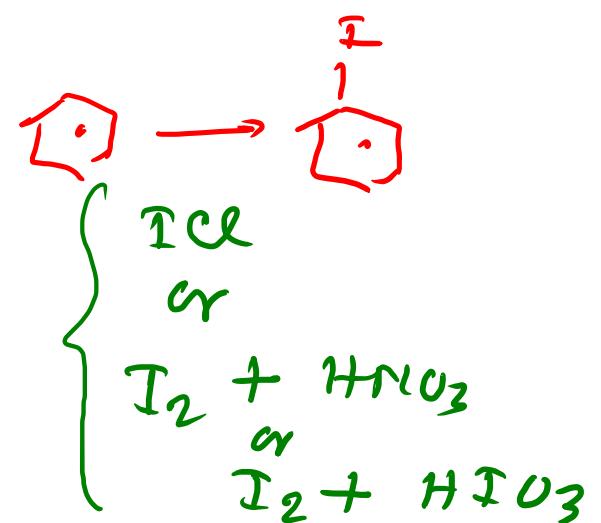


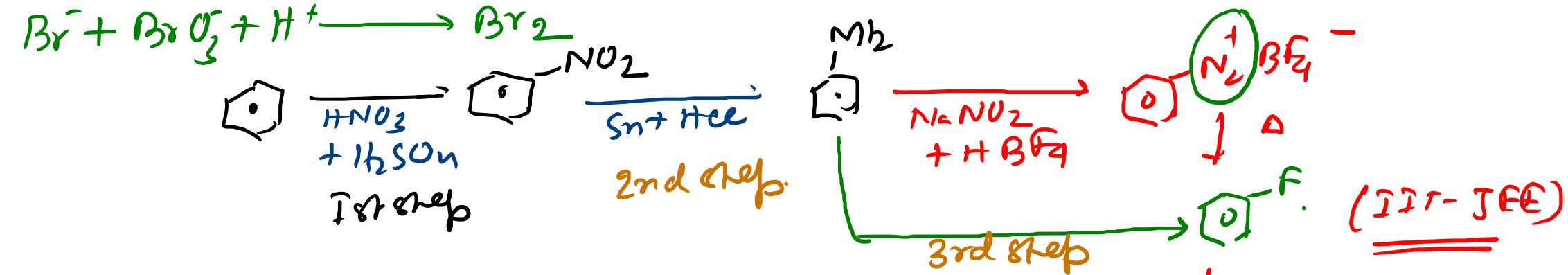
Ans: Caro's Acid
Permonosulfonic Acid



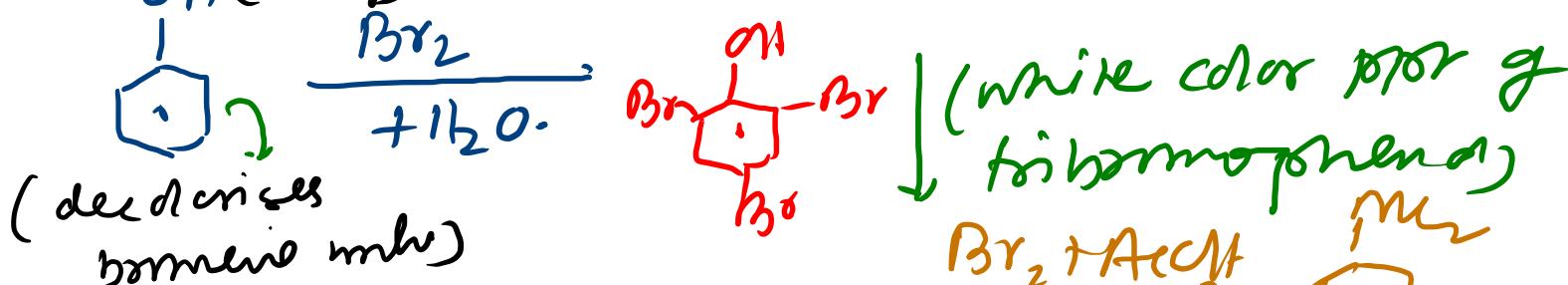
eqn is shifted to forward direction

Direct fluorination is not possible
 F^+ does not exists; extremely unstable.

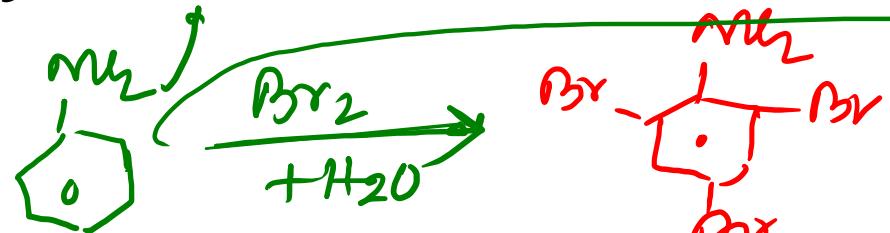




Bartlett - Schiemann Reaktion.



(deodorizes
burns mhu)

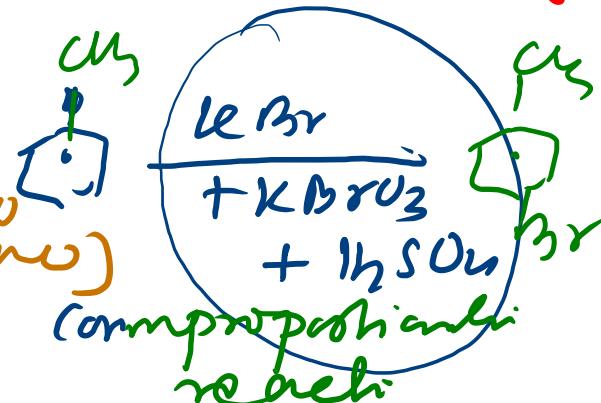


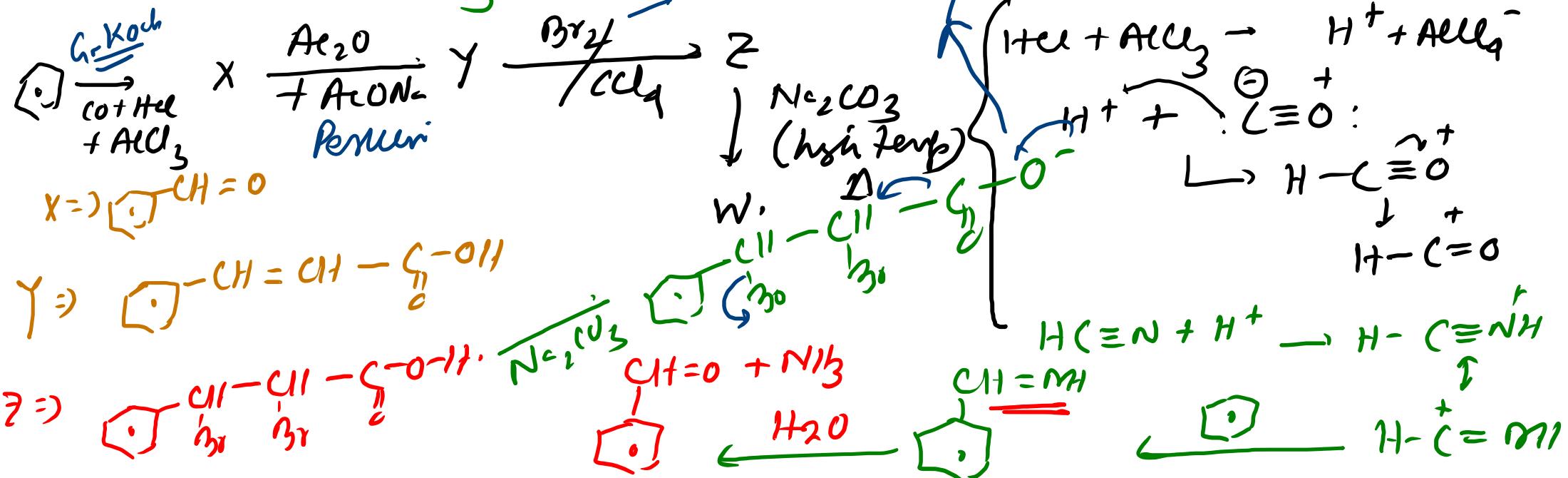
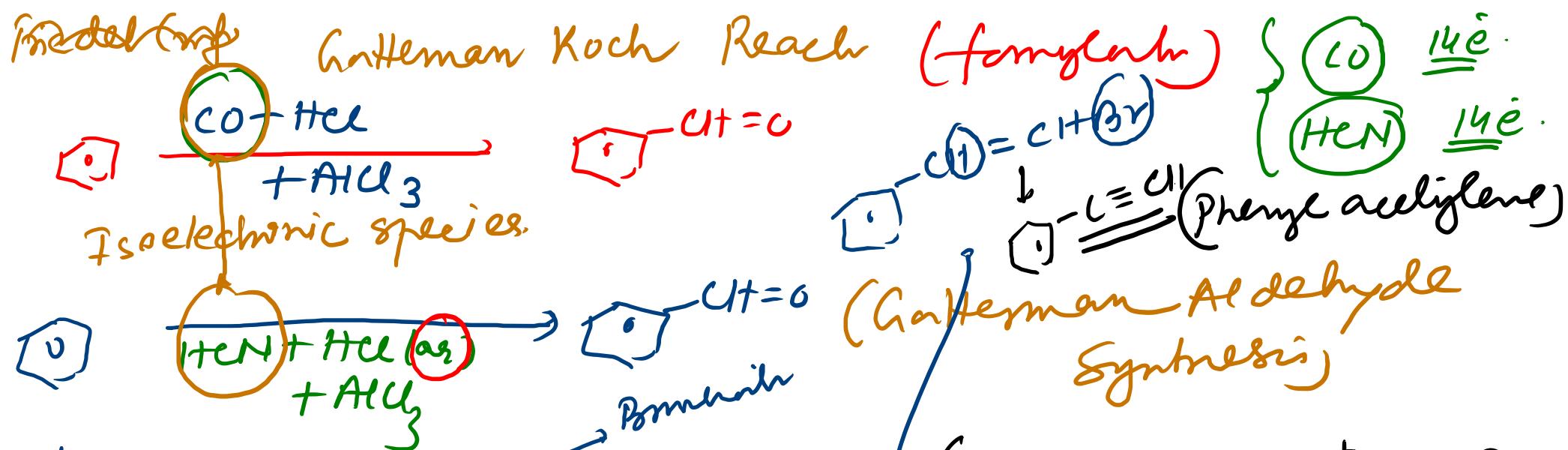
2,4,6 tribromo
(amlinies)



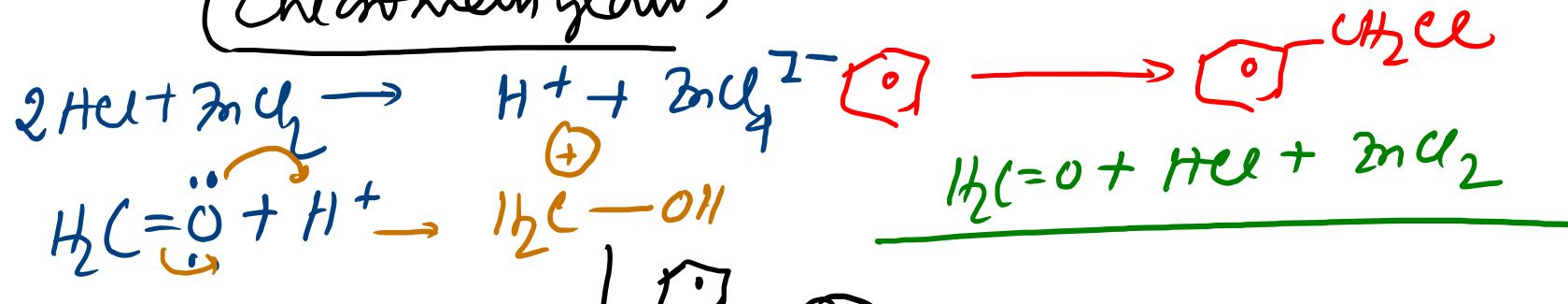
2,4,6 tribromo

(amlinies)



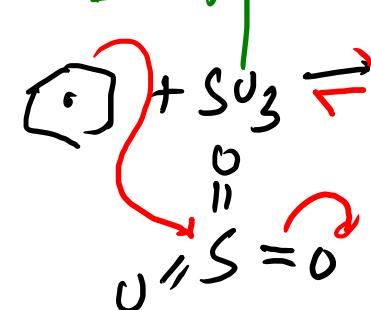


(Chloromethylglabi)



=)

(acting as
electrophile)

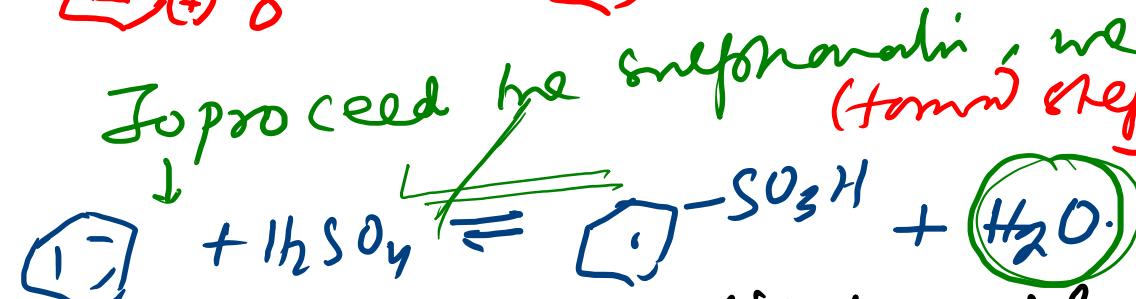


Sulphonation

i) SO_3

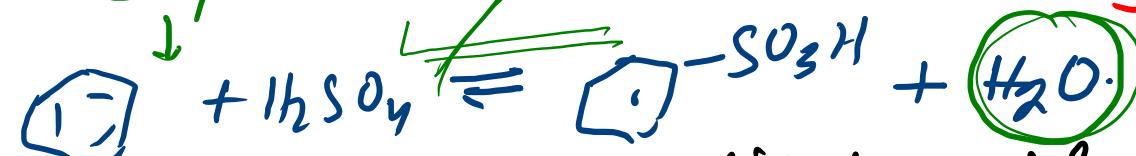
ii) conc H_2SO_4

iii) Ozoneum
 $\text{H}_2\text{SO}_4 + \text{SO}_3$

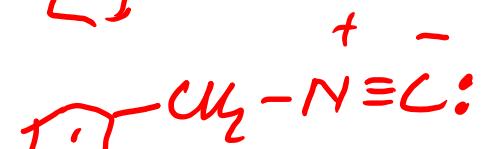


To proceed the sulphonation, we use conc
(strong) step
 H_2SO_4 .

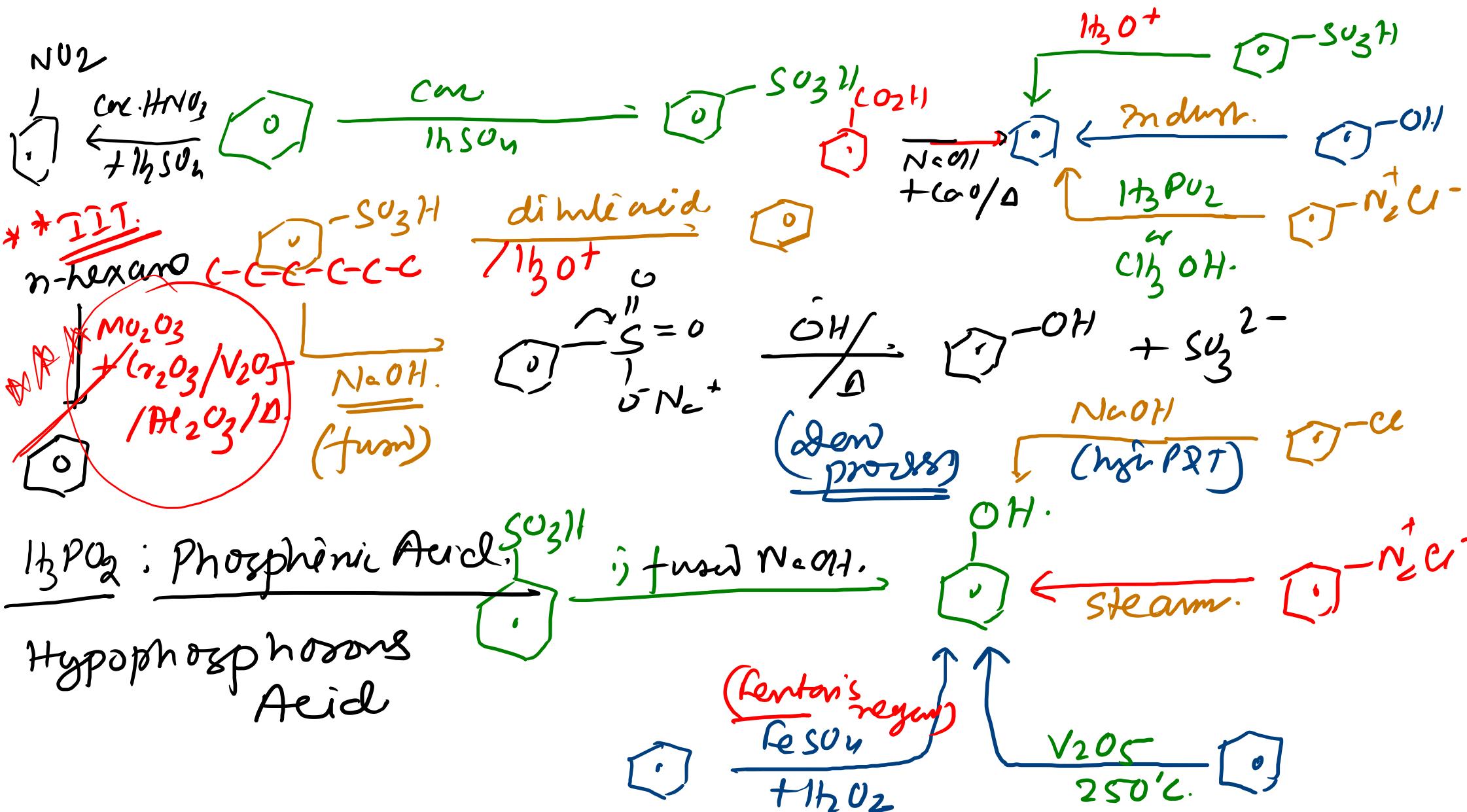
To proceed desulphonation process dilute acid must be used.

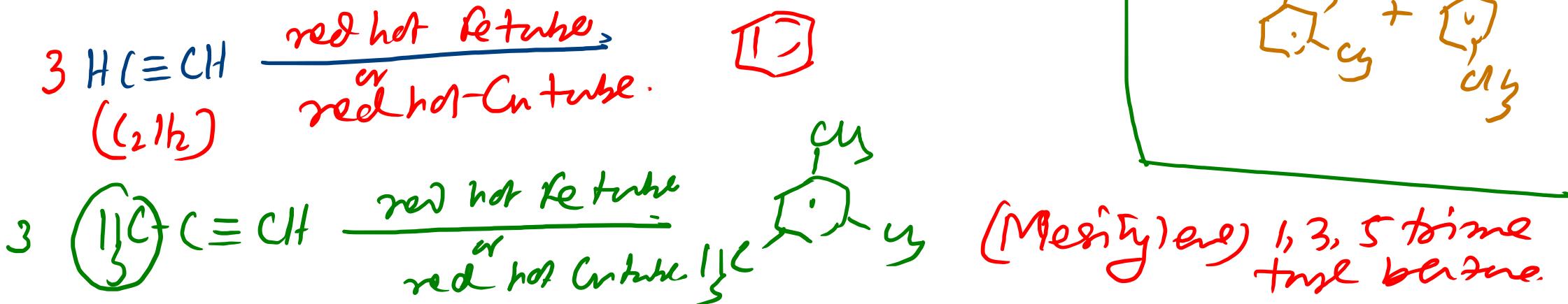
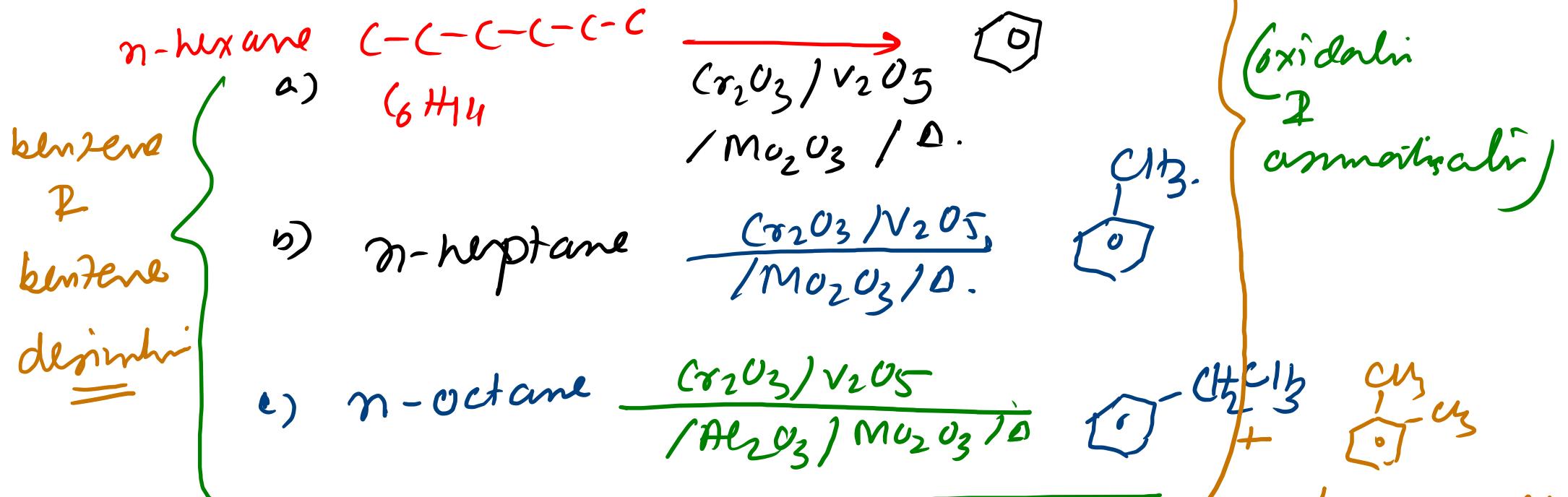


(cyanide)



(Isocyanide)





nitro. } $C_6H_6 = C_6D_6 \equiv C_6T_6$. reactivity order
 chlorin. On changing isotope
 bromine. reaction rate is not change. These reactions does
 bromine / iodine / not show kinetic isotope effect
Brønsted / Cope reaction

sulphonate } $C_6H_6 > C_6D_6 > C_6T_6$
 + iodinate } On changing isotope kinetics reaction rate is changed.
 These reactions show kinetic isotope effect
 bond energy: $(-T) > (-D) > (-H)$
 \hookrightarrow rate of reaction is less.
 On s.d.s. ($-H$ bond breaking takes place)
 sulphonate / iodinate

- => nitrobenzene
=> nitrobenzene
=> chlorobenzene
=> bromobenzene
=> iodobenzene
=> Sulphonobenzene
- => fenoxobenzene (indirect process)
- => Gatterman Koch.
- => Gatterman Aldehyde
- => Benzene Preparation
<=> Phenol
- (Importance of sulfonation process)
- (10)
- different processes