

Benzene :

MOP :-

- 1) Soda lime decarboxylation $\text{NaOH} + \text{CaO}$ $\rightarrow$ 2
- 2) Gyclic Coupling $\text{R.H.T} / \text{Fe}$ $\rightarrow$ 2
- 3) Reduction of Phenol Zn $\rightarrow$ 2

Properties :

- EAS
- i) Nitration $\text{N}_2\text{O}_5 / \text{NO}_2^+ \text{F}^-$ $\rightarrow$ 3
 - 2) Halogenation $\text{X}_2 + \text{anhy FeX}_3$ $\rightarrow$ 4
 - 3) Sulphonation $\text{SO}_3 + \text{H}_2\text{SO}_4$ $\rightarrow$ 4
 - * 4) Friedal Craft's alkylation $\text{R-X} + \text{AlCl}_3$ $\rightarrow$ 5
 - 5) Friedal craft's acylation $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{X} + \text{AlCl}_3$ $\rightarrow$ 5
 - * *) Directive Influence of groups $\rightarrow$ 8
 - 6) Addition Rxn's Cl_2 / hv $\rightarrow$ 13

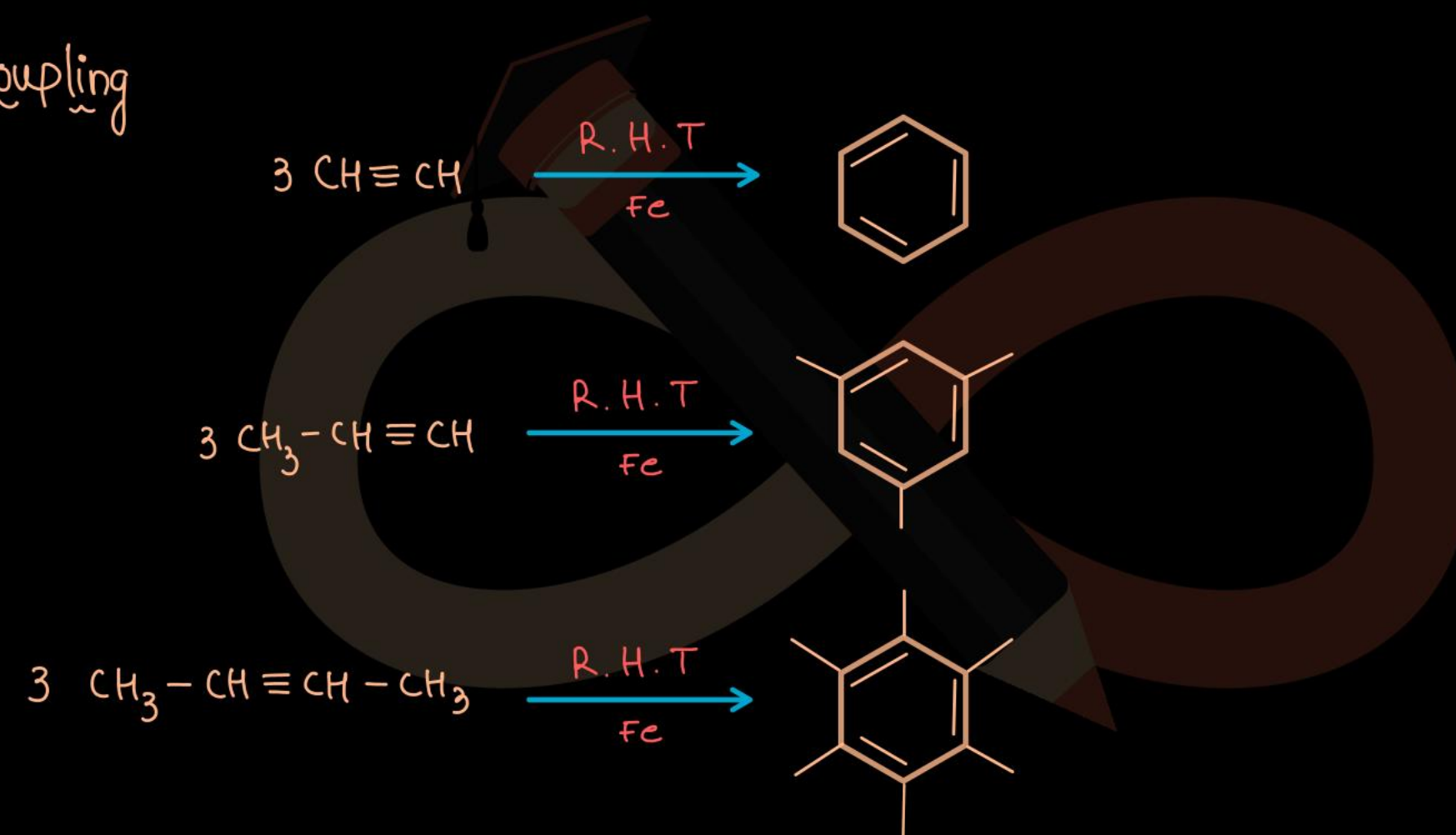
☆ Practice $\rightarrow$ 6, 9, 10

Preparation:-

1) by Sodalime decarboxylation



2) Cyclic coupling



③ Reduction of Phenol:



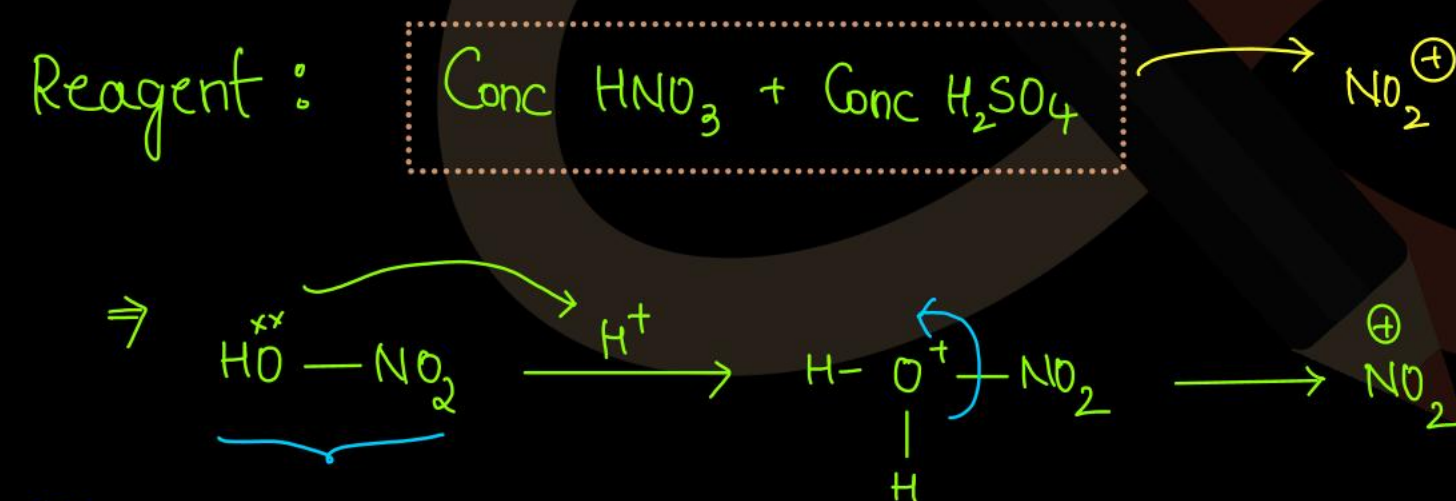
Properties :-

i) Electrophilic Substitution rxn's / Electrophilic Aromatic substitution rxns (EAS) :

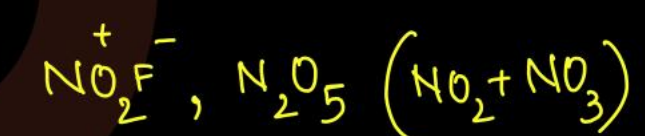


Types :

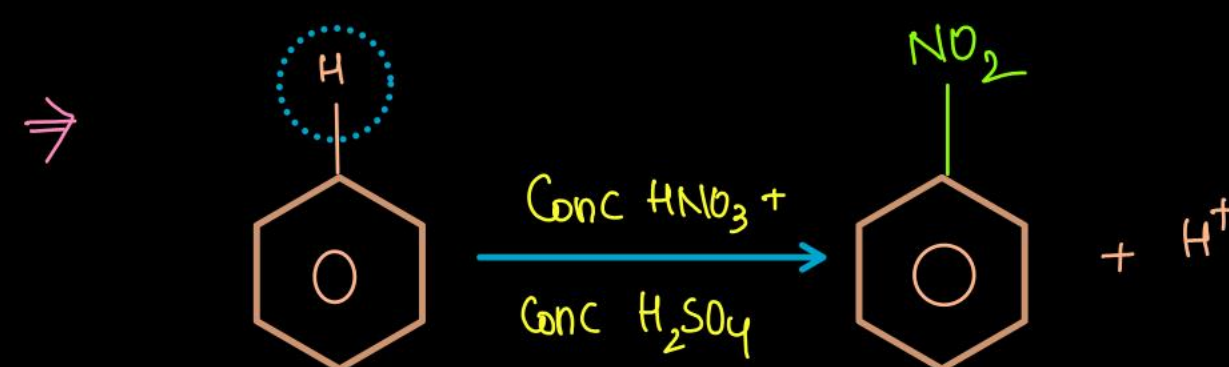
i) Nitration :-



other reagents :-

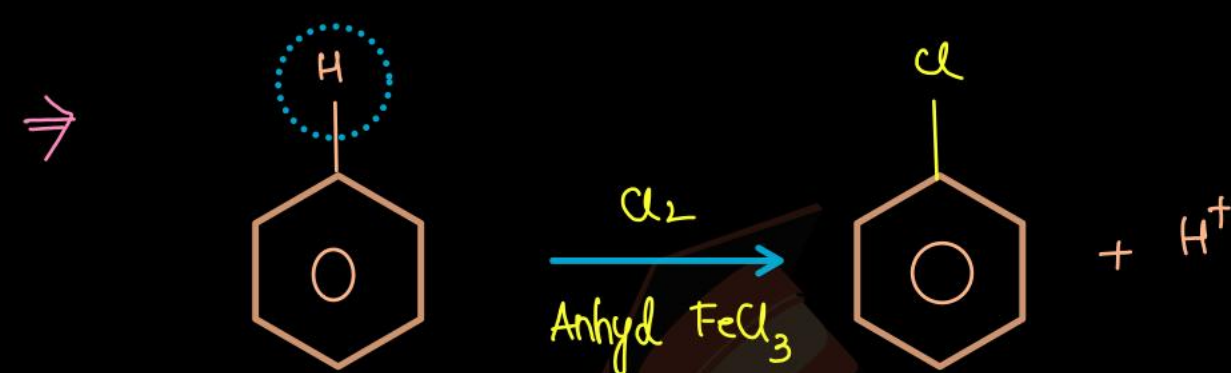


(*) acts as lewis base



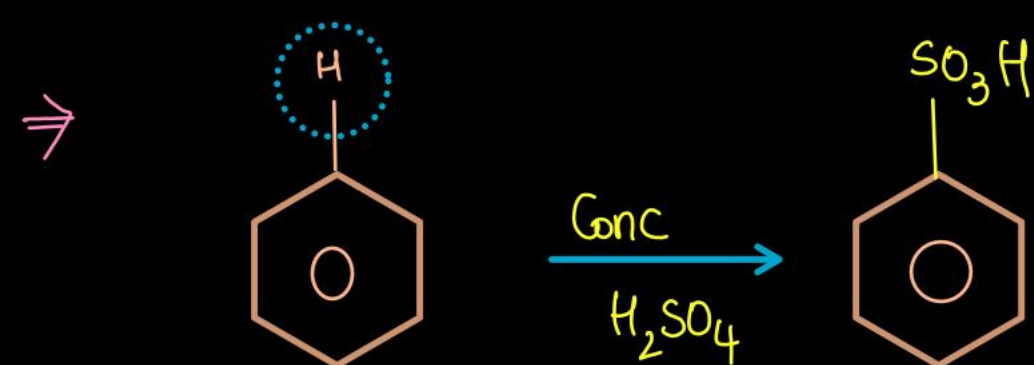
ii) Halogenation :-

Reagent: $X_2 + \text{anhydrous } FeX_3 \rightarrow X^{\oplus}$

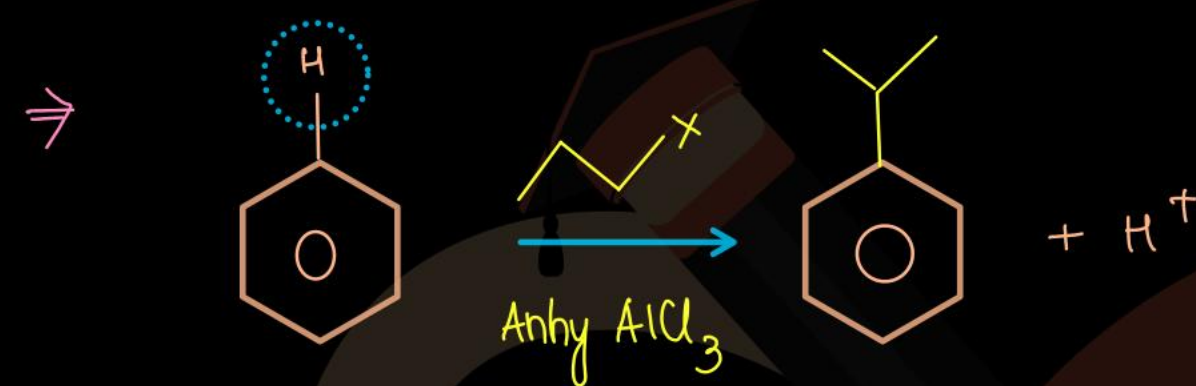
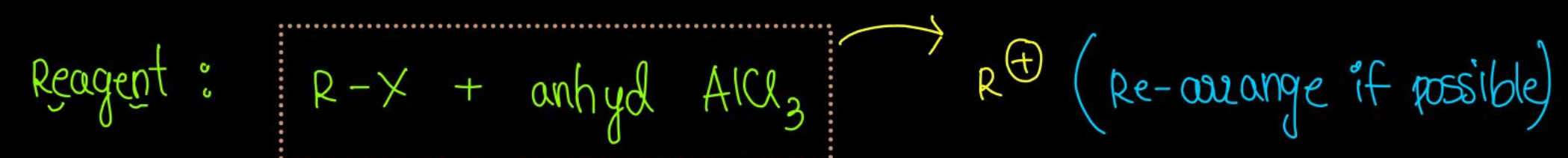


iii) Sulphonation

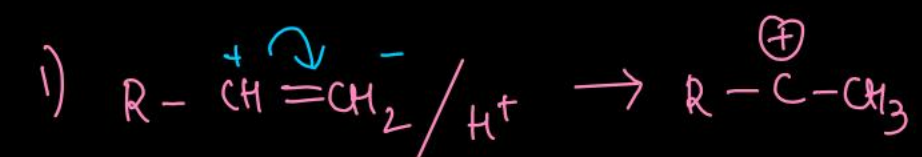
Reagent: $\text{Conc } H_2SO_4 / \text{fuming } H_2SO_4 / \text{oleum } (SO_3 + H_2SO_4) \rightarrow SO_3$



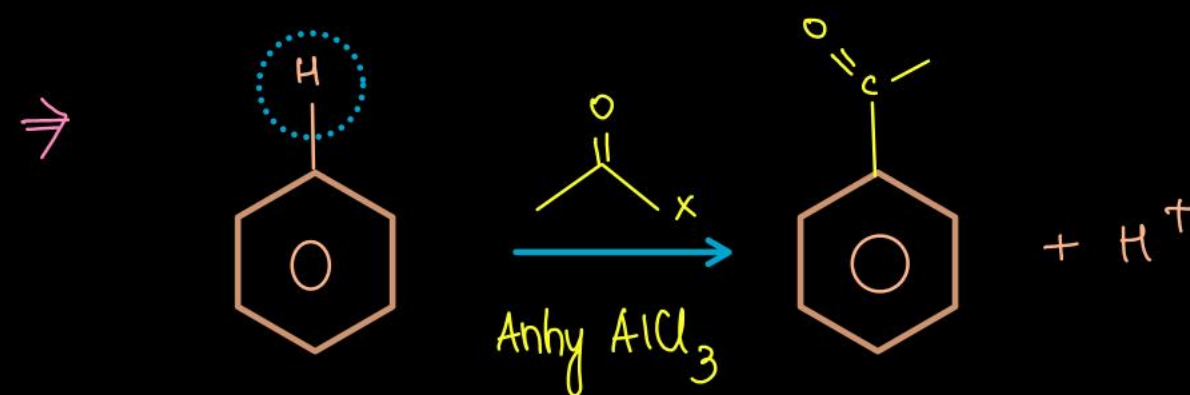
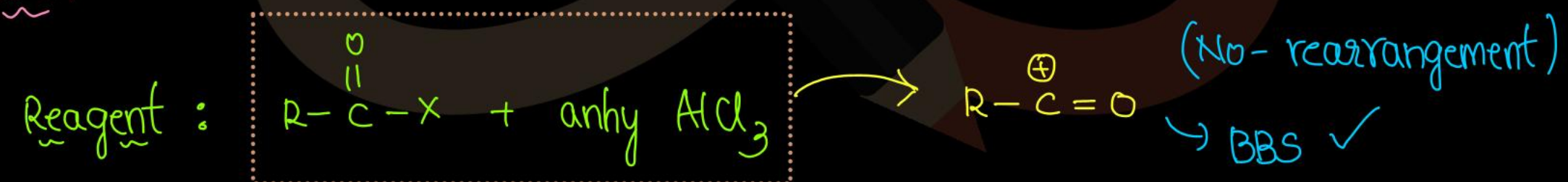
iv) Freidal craft's alkylation:



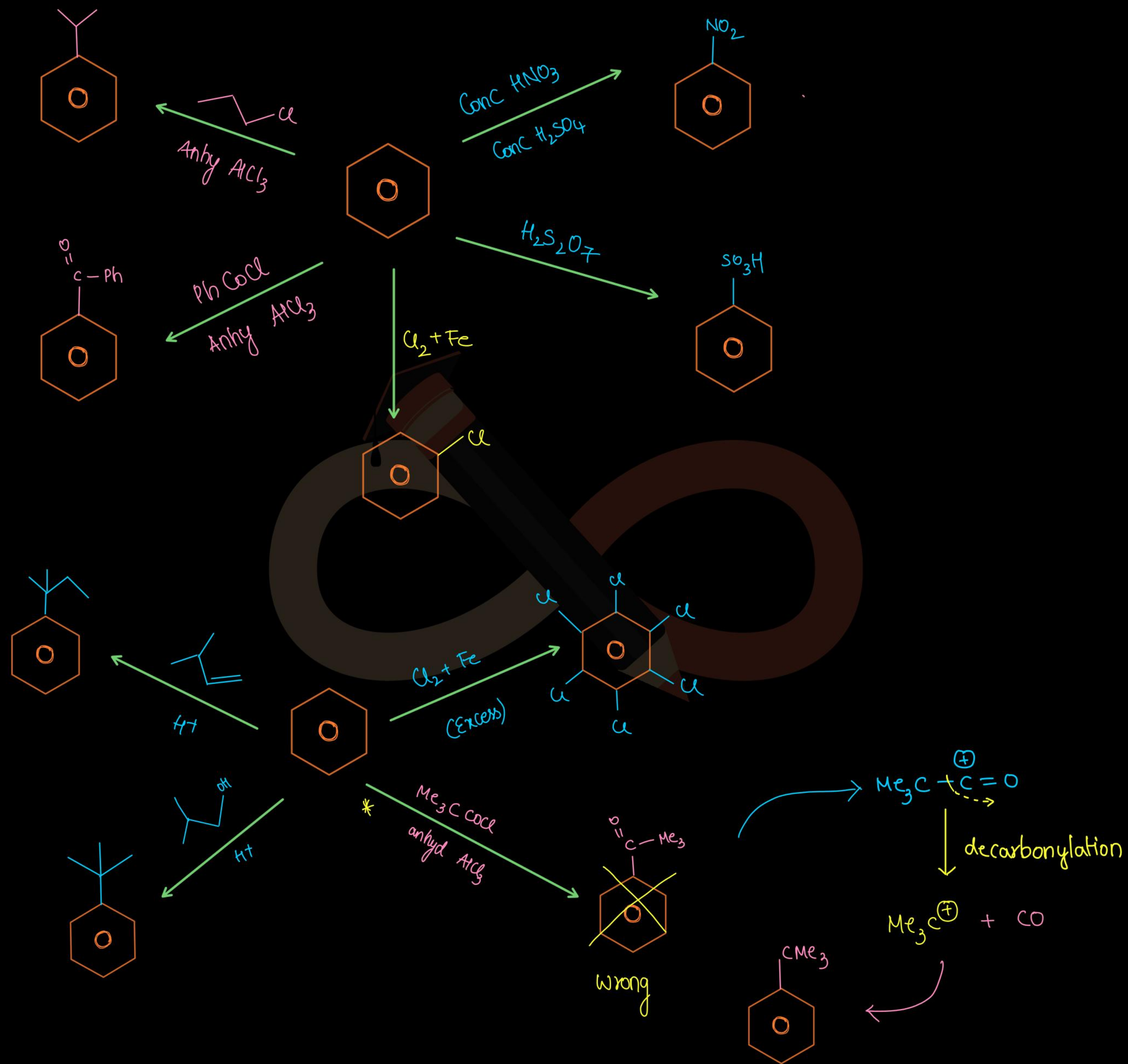
other reagents



v) Freidal craft's acylation



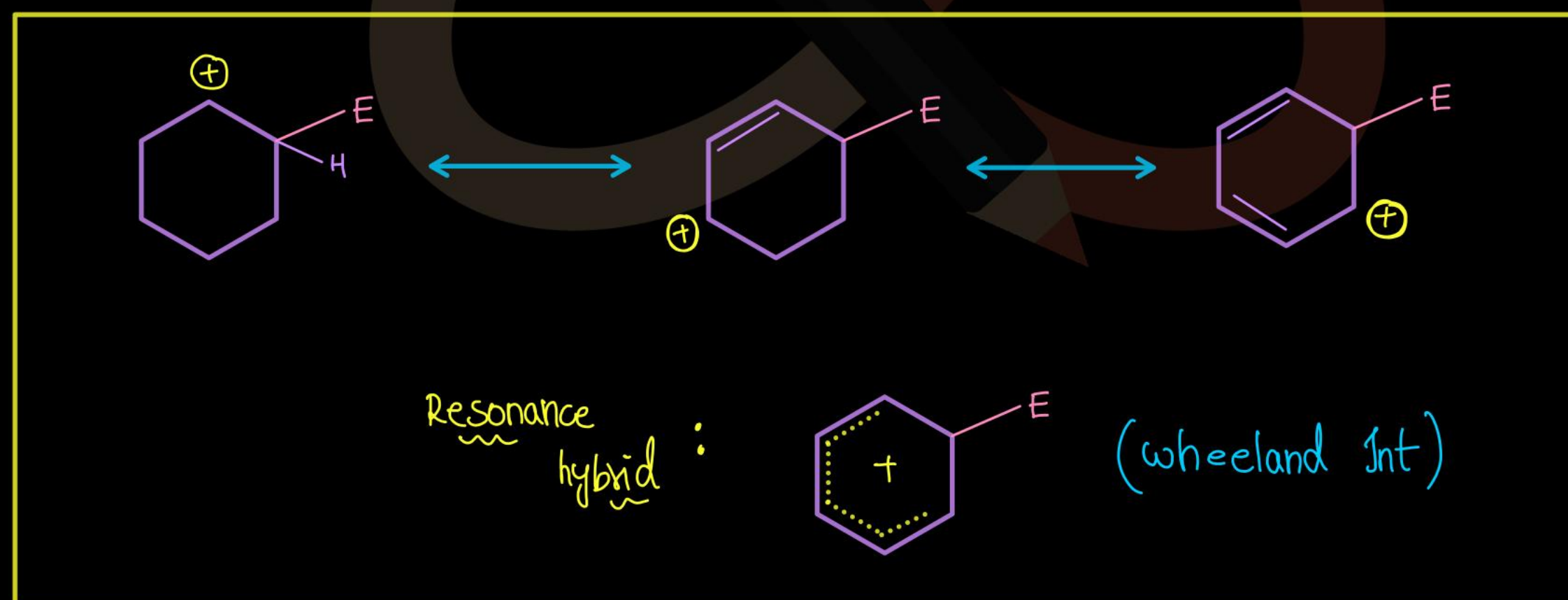
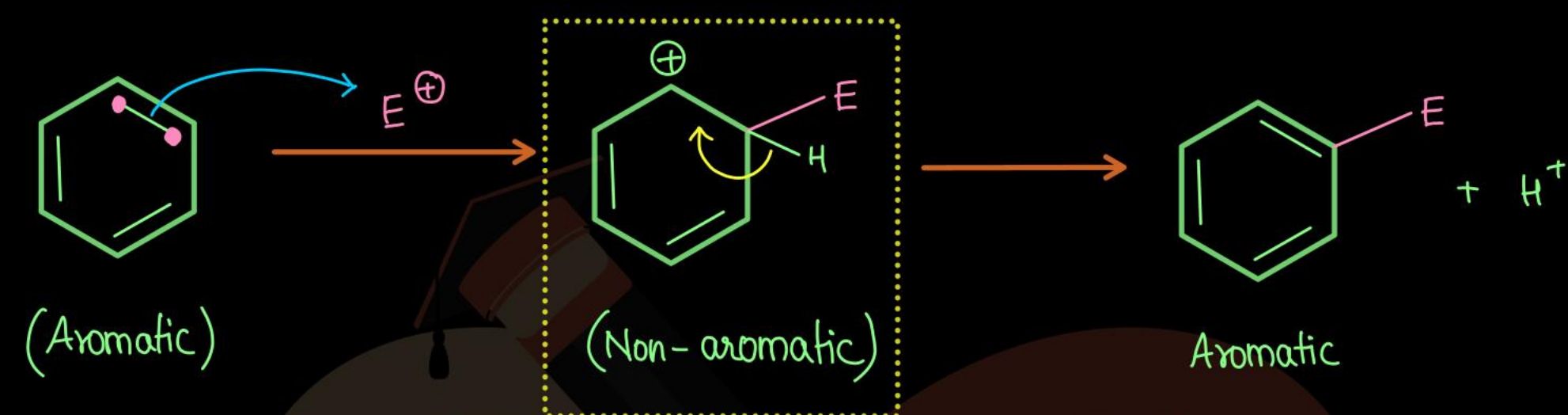
Practice :-



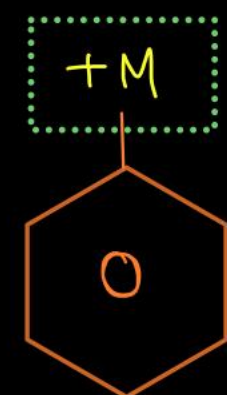
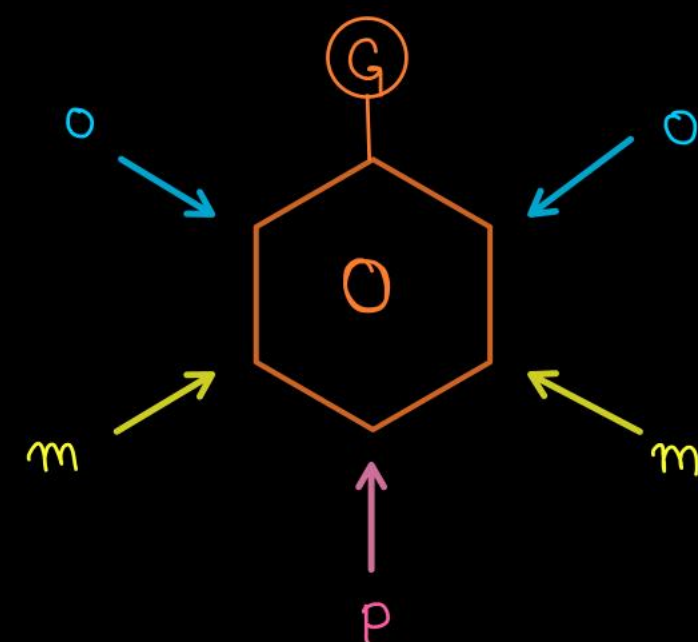
Mechanism

i) Generation of E^+ ✓

ii) Attack of E^+ (formation of C^+)



* Directive Influence of Group



O, P directing ($\text{NH}_2, \text{OH}, \text{OCH}_3, \text{OCOR}, \text{Ph}, \text{X}$)

$+M > -I \rightarrow$ Activating : $\text{OH}, \text{NH}_2, \text{OCOR}, \text{NHCO}, \text{R}$

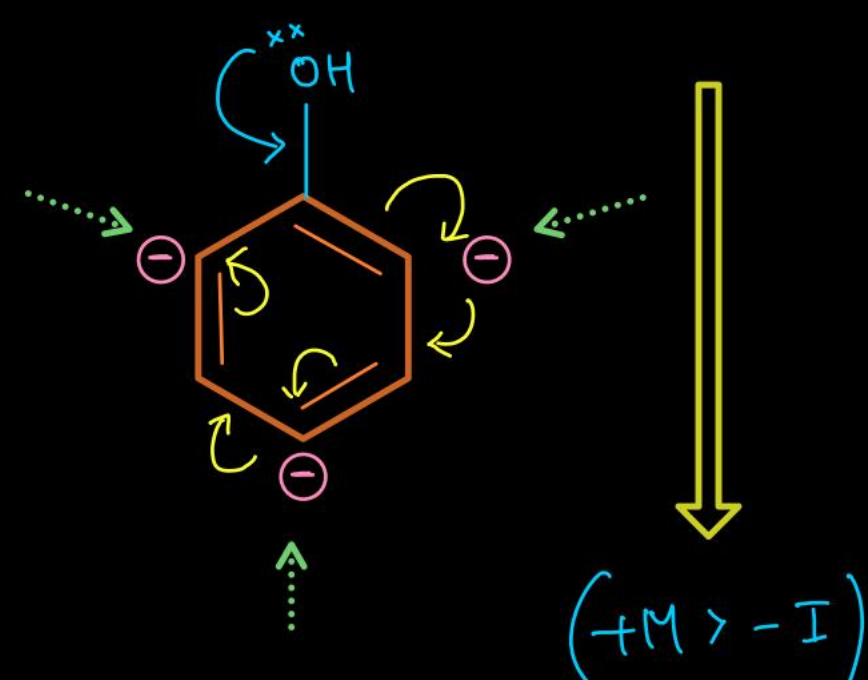
$-I > +M \rightarrow$ Deactivating : X (halogen)



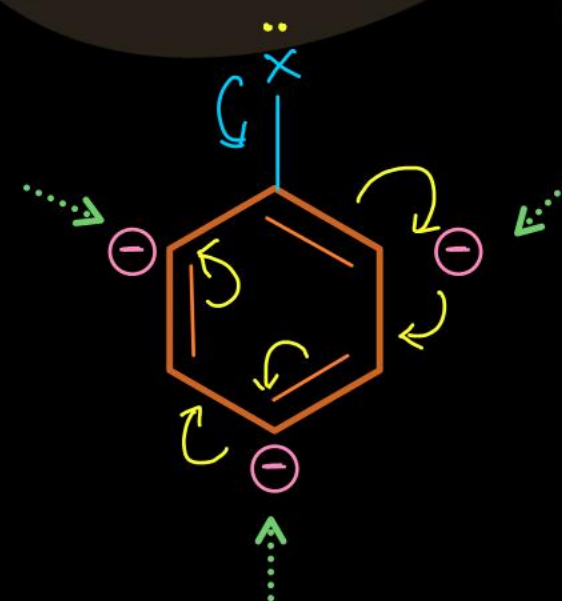
M directing ($\text{NO}_2, \text{SO}_3\text{H}, \text{CN}, \text{CHO}, \text{COR}, \text{COOH}$)

* Strong deactivating

1) O, P directing



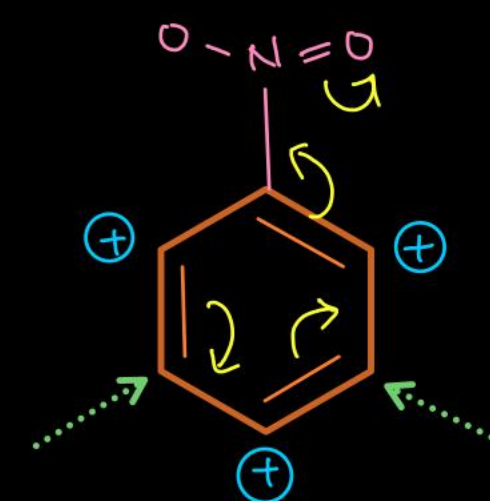
2) OP - deactivating



$(-I > +M)$

3) Meta directing

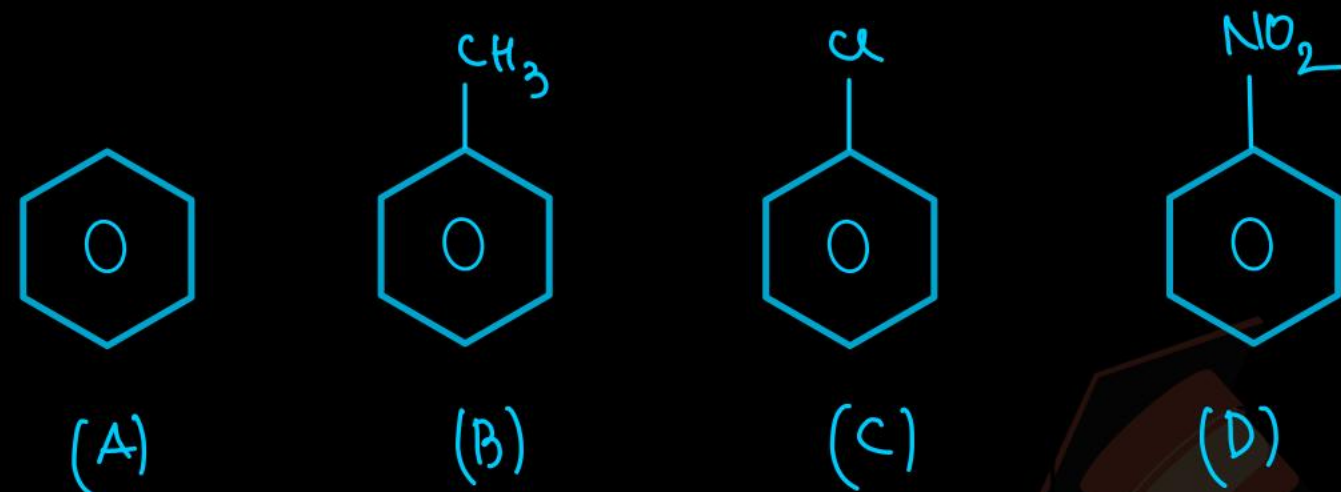
$(-I \& -M)$



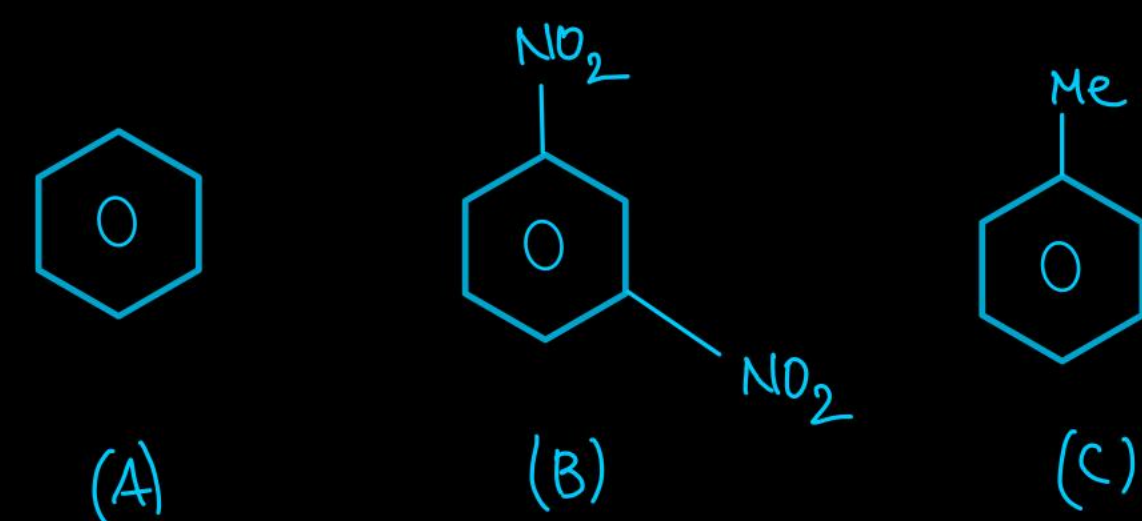
Practice:-

① Compare reactivity towards ESR

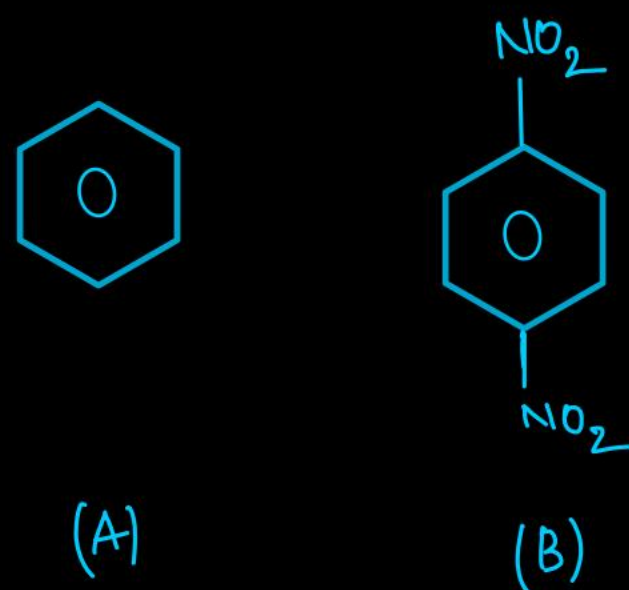
1Q)



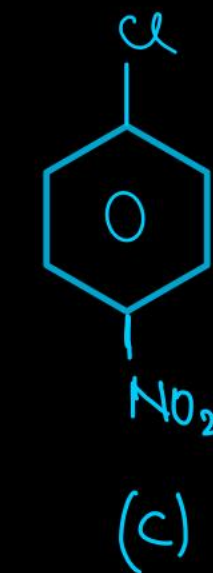
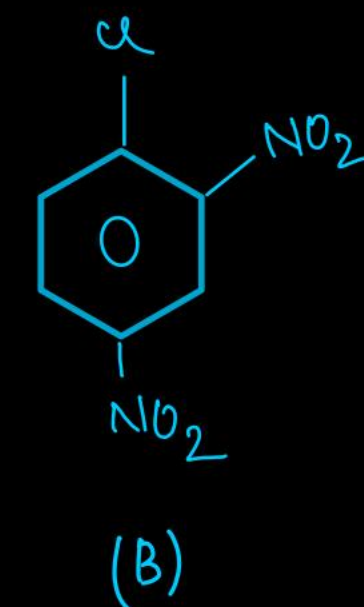
2Q)



3Q)



4Q)



1) $B > A > C > D$

2) $C > A > B$

3) $A > C > B$

4) $A > C > B$

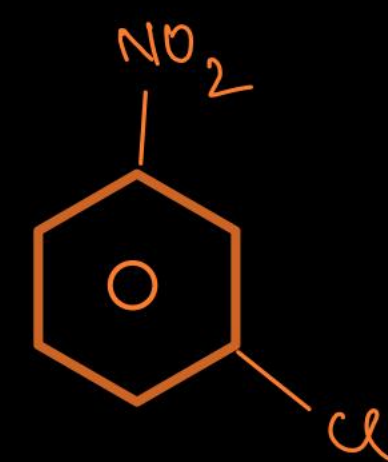
② Convert



iii)



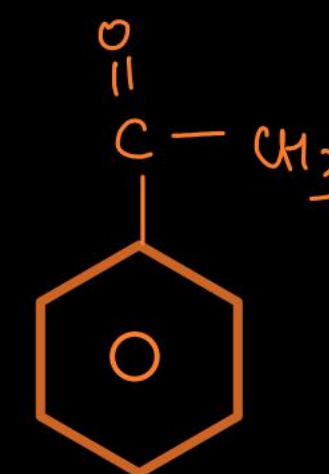
iv)

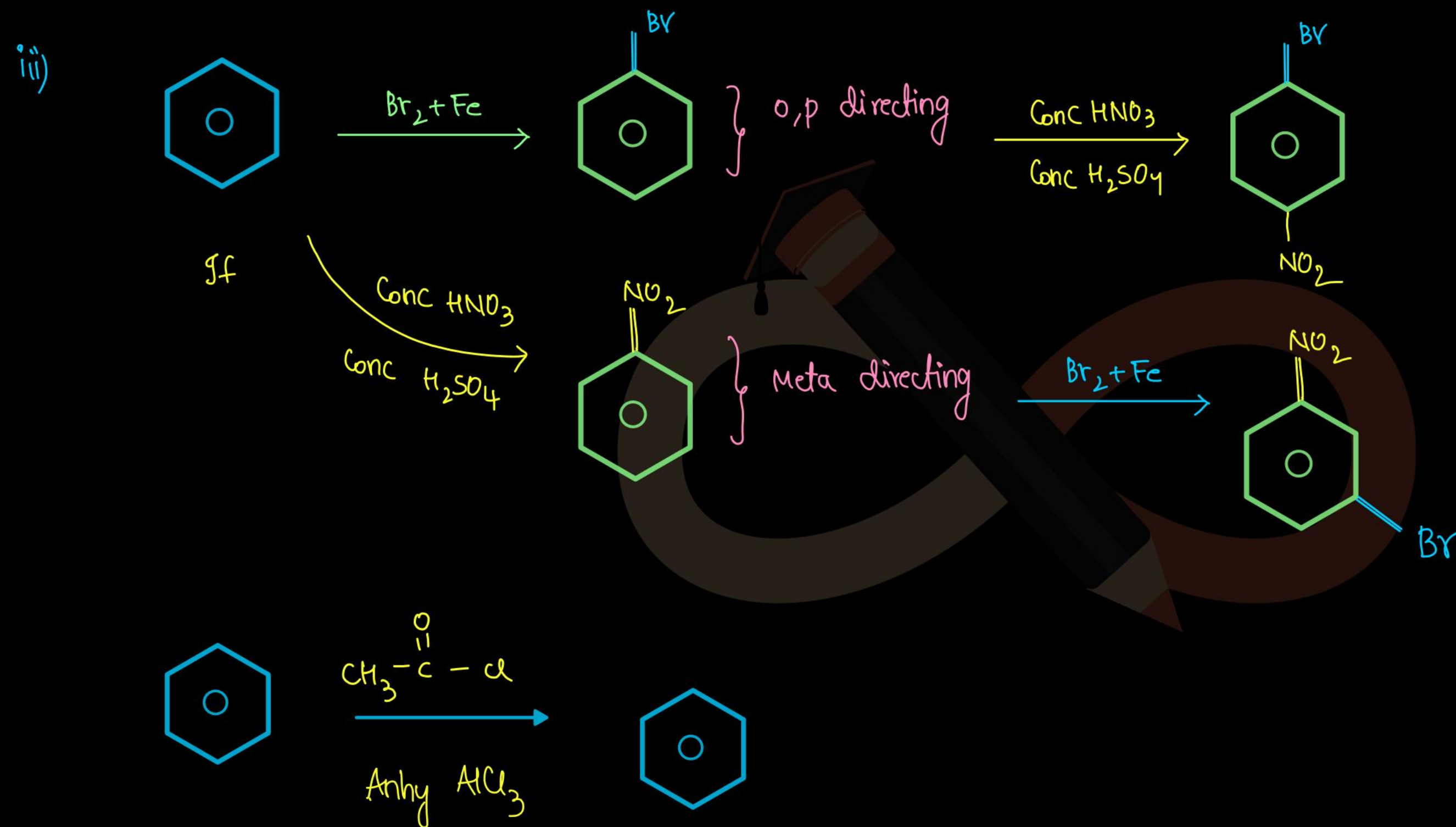
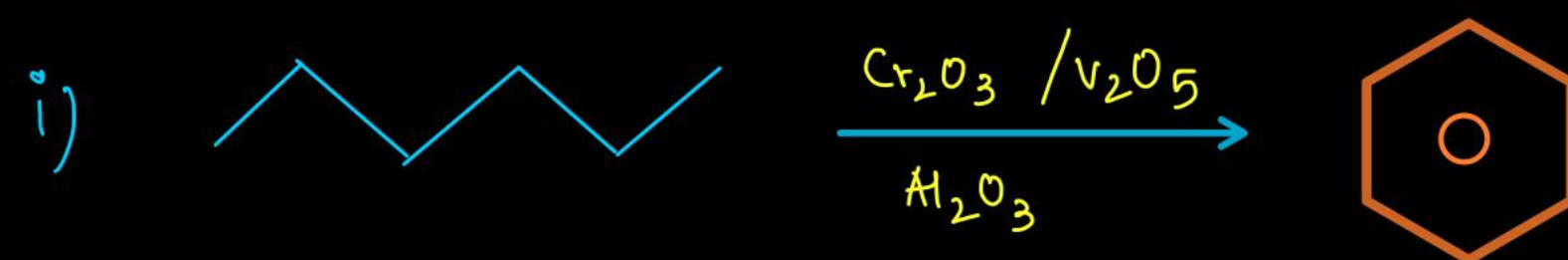


v)

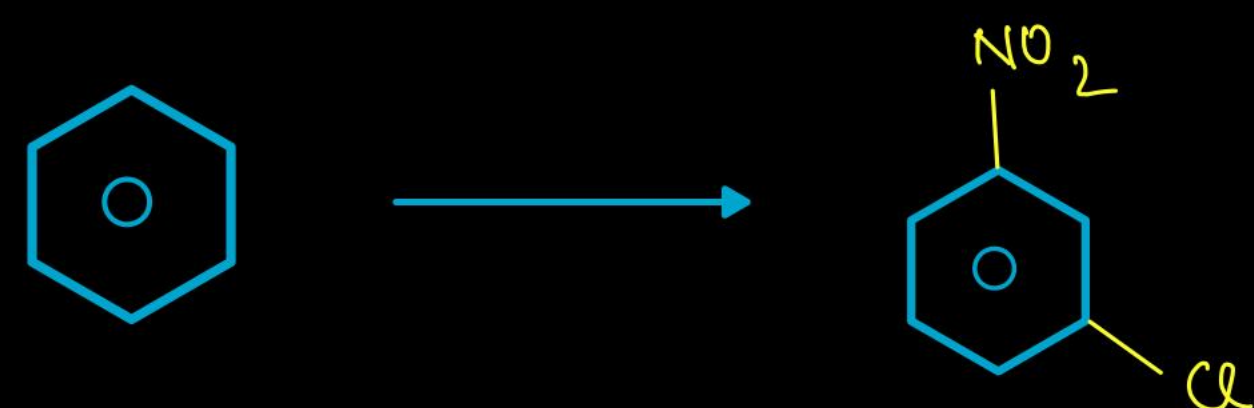


vi)

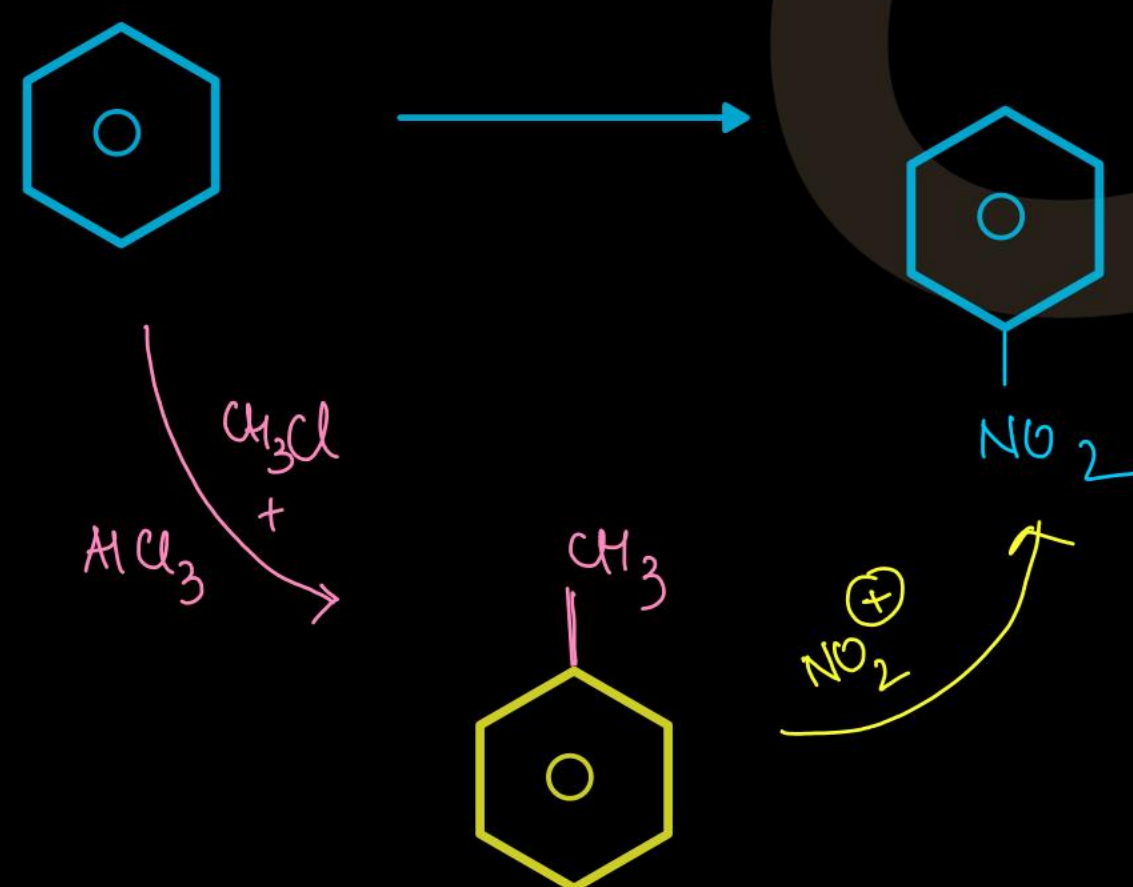
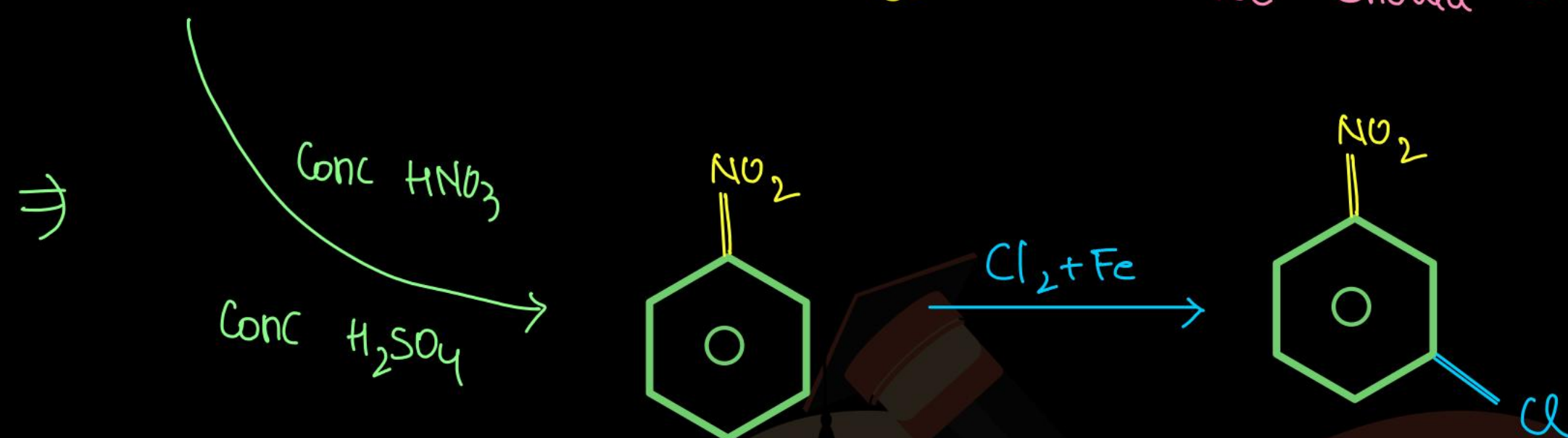




iv)

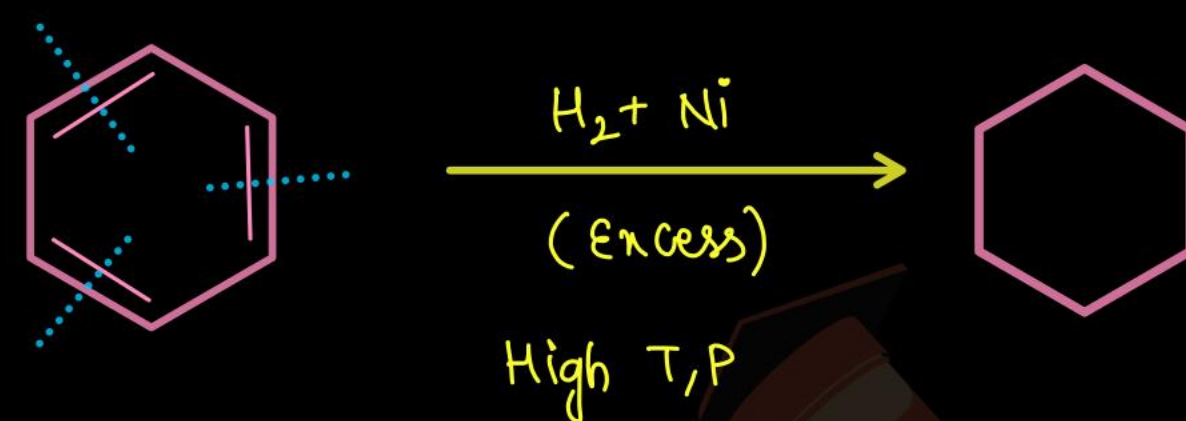


} Since they are in meta
we should start with Nitration



Addition Rxn's :

i) Hydrogenation



ii) $Cl_2/h\nu$

