

Alcohols

MOP

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- 2) Cyclic ethers▶
- 3) O_2/H^+ ▶

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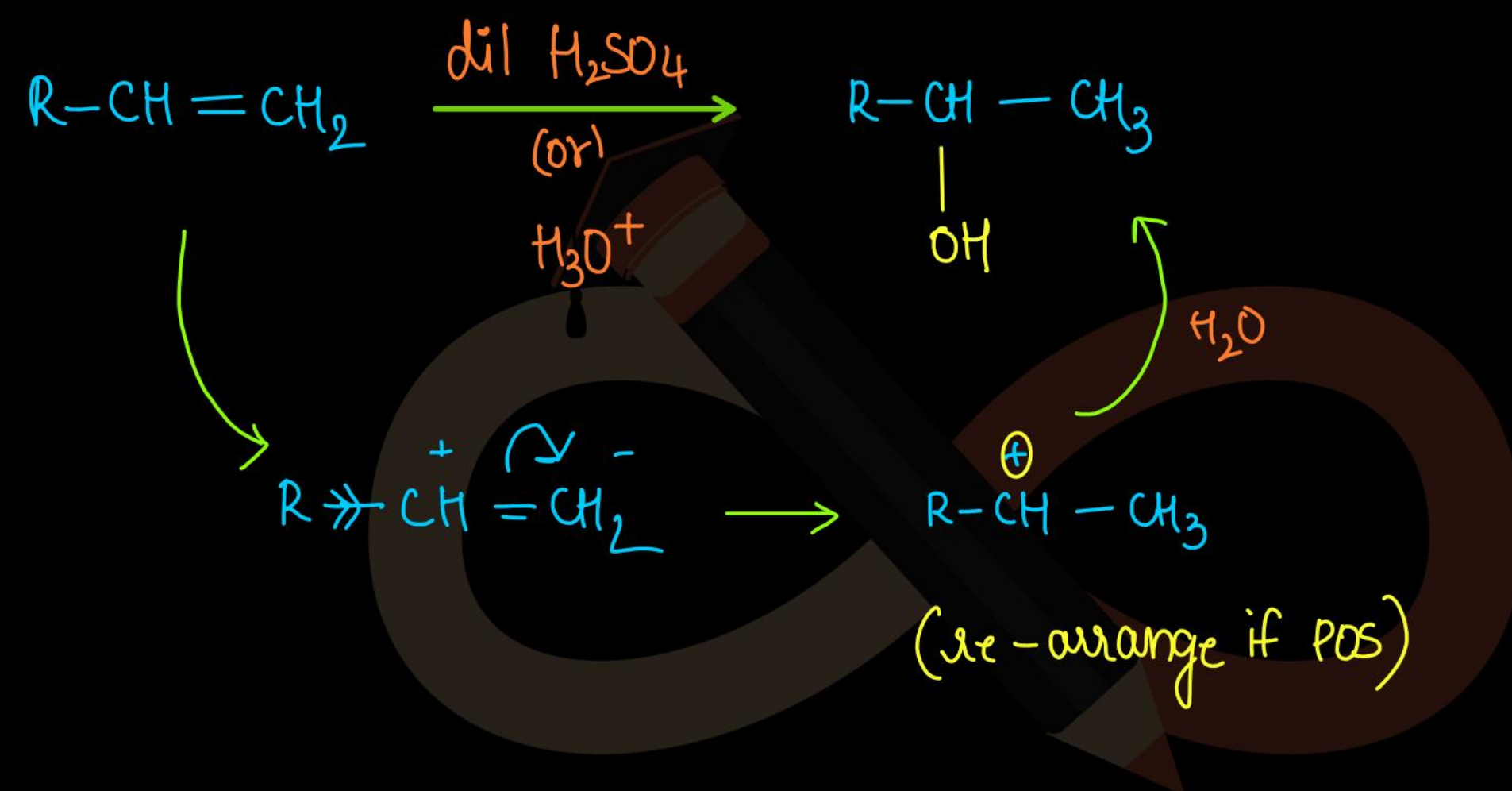
*) Mild OA▶ 39

*) Strong OA▶ 40

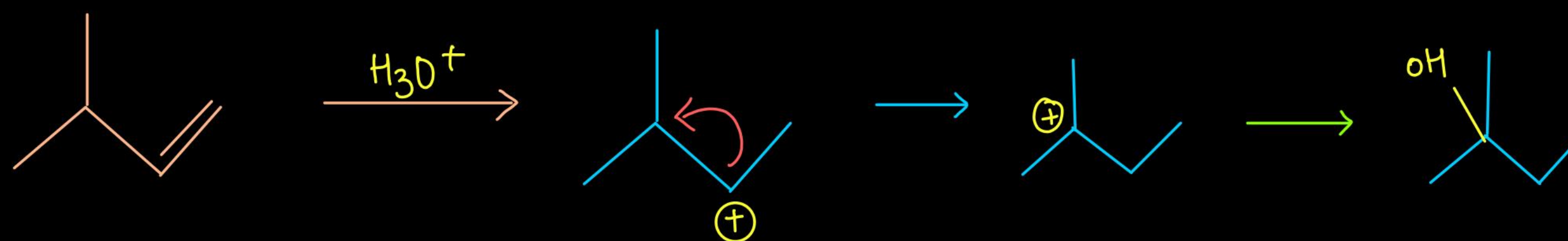
*) Physical properties▶ 42

① from alkenes

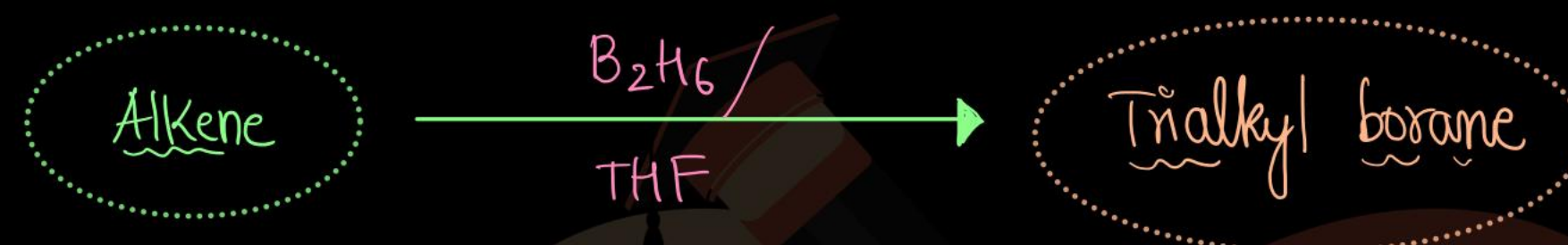
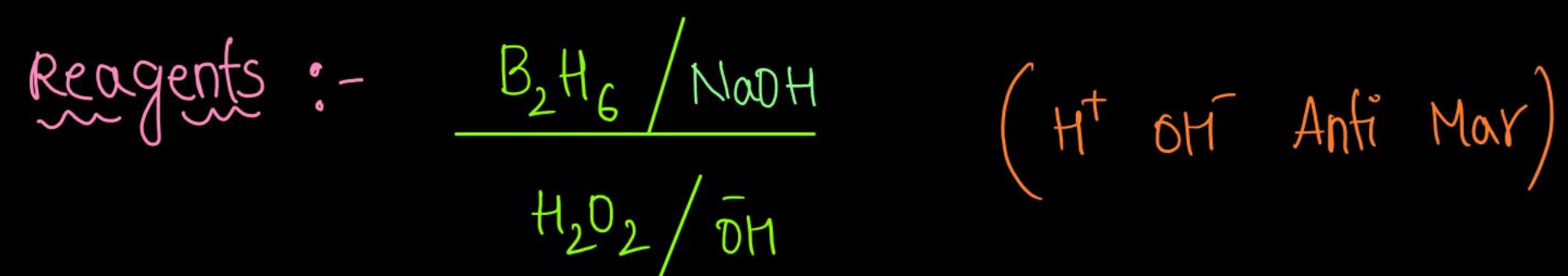
i) Catalytic Hydrogenation



Ex:-



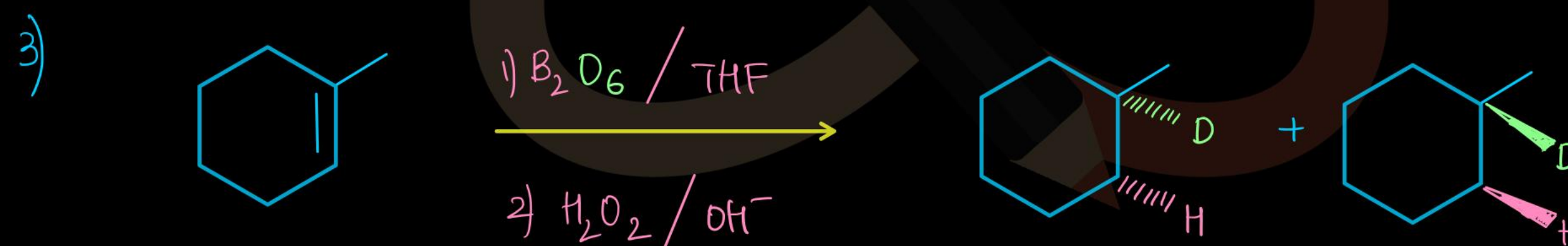
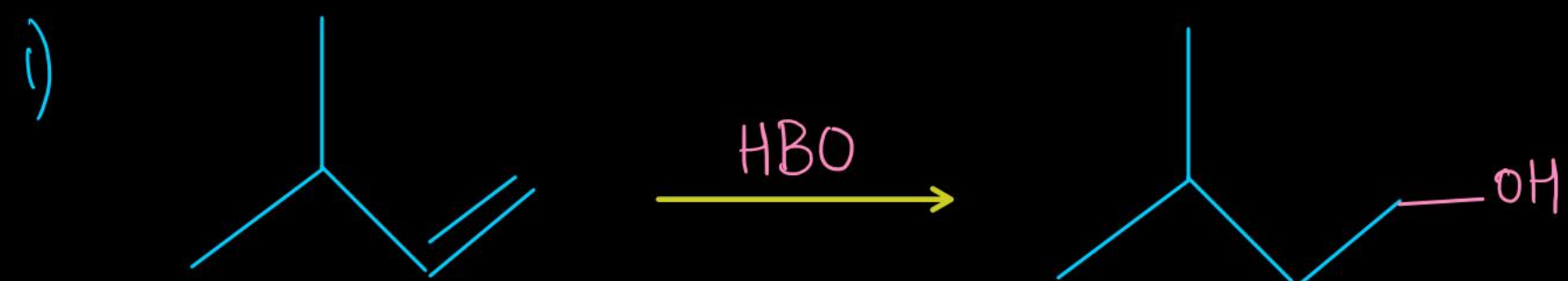
ii) HydroBoration Oxidation (HBO)



Note:-

- $*$ Anti Mar
- $*$ Syn addition
- $*$ No carbocation formation
- $*$ stereospecific
- $*$ regioselective

Ex:



iii) Oxymercuration - demercuration (OM:DM)

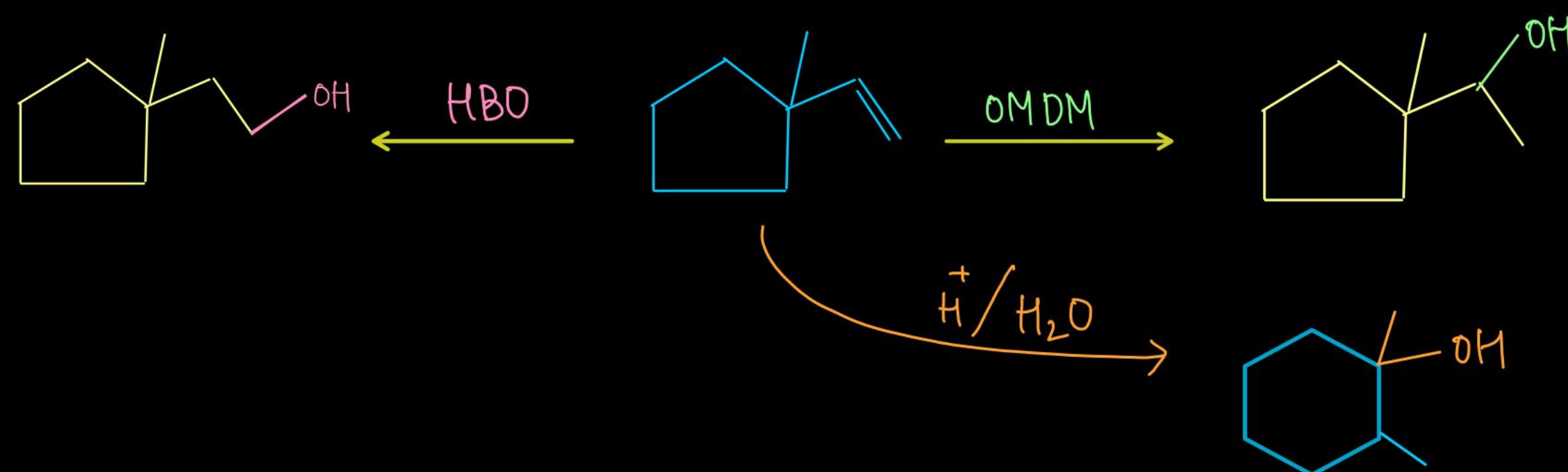
Reagents :-
① $\text{Hg}(\text{OAc})_2$
② $\text{NaBH}_4 / \text{OH}^-$



Note :-

- * No carbocation is formed
- * Markonikov's rule
- * No - rearrangement
- * Anti - addition
- * Stereospecific

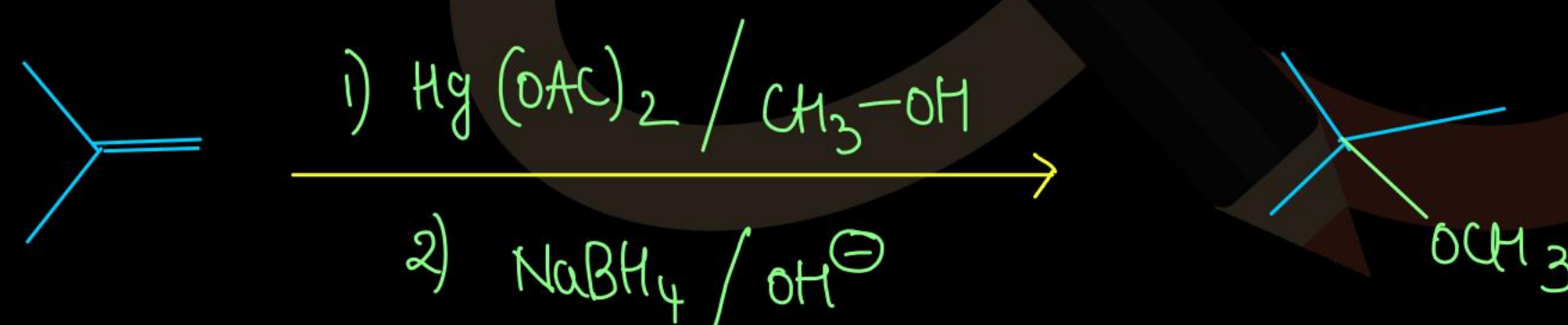
①



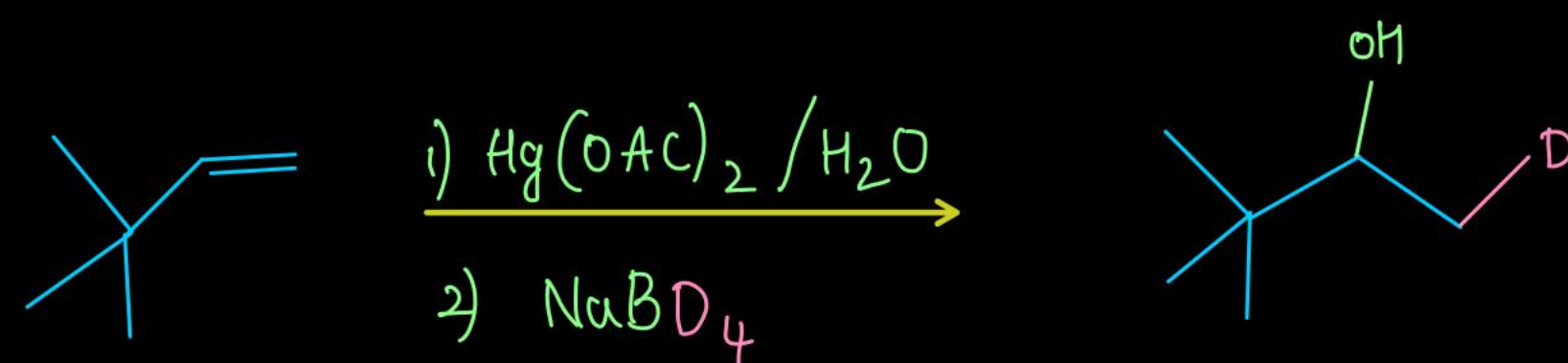
②



③

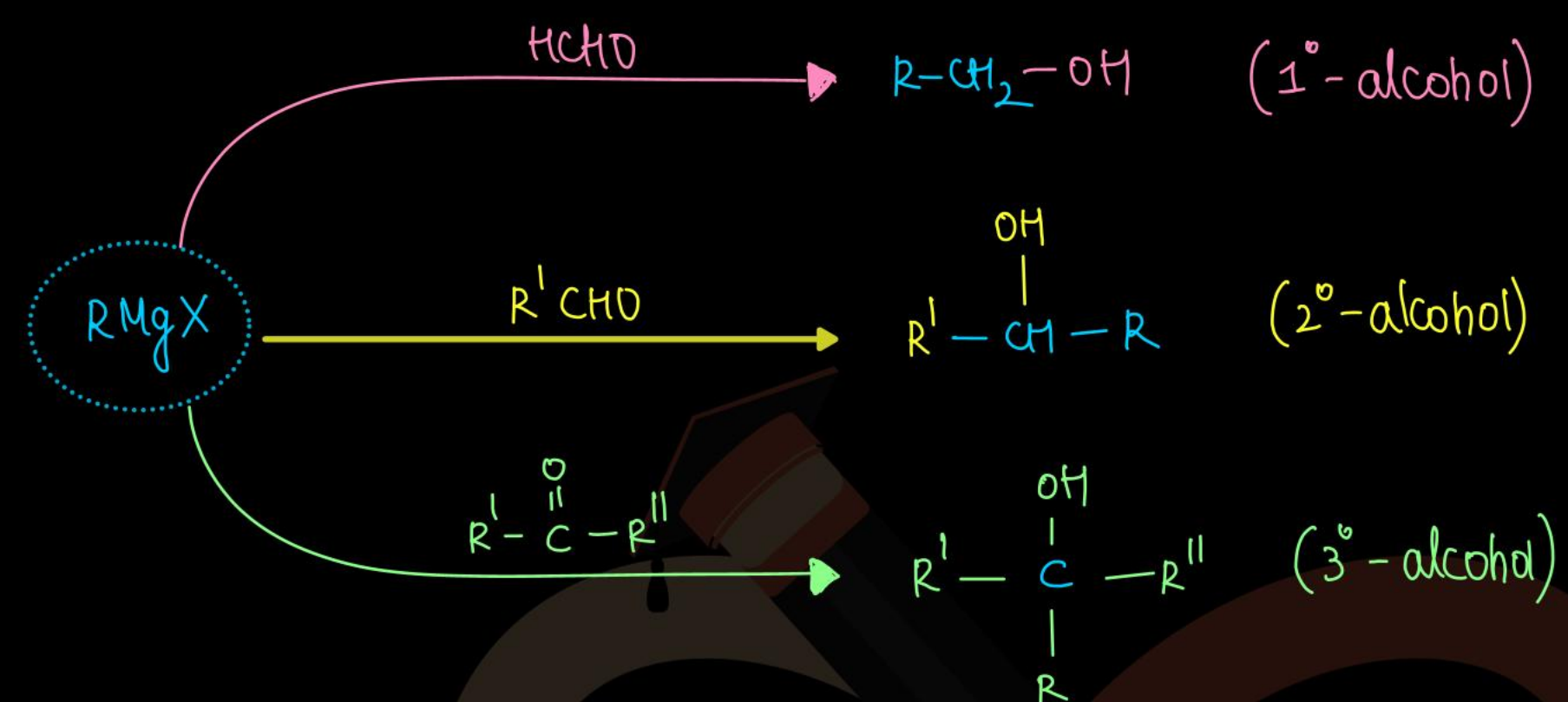


④

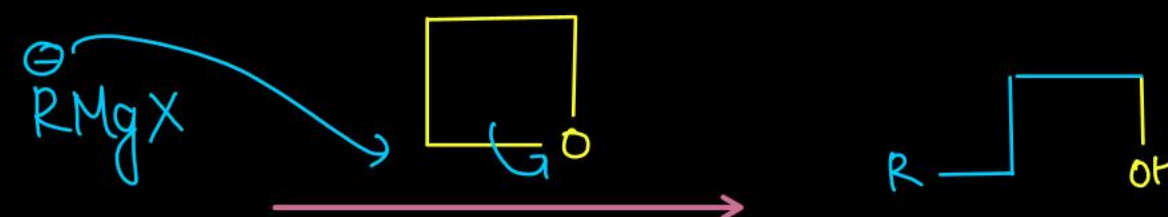
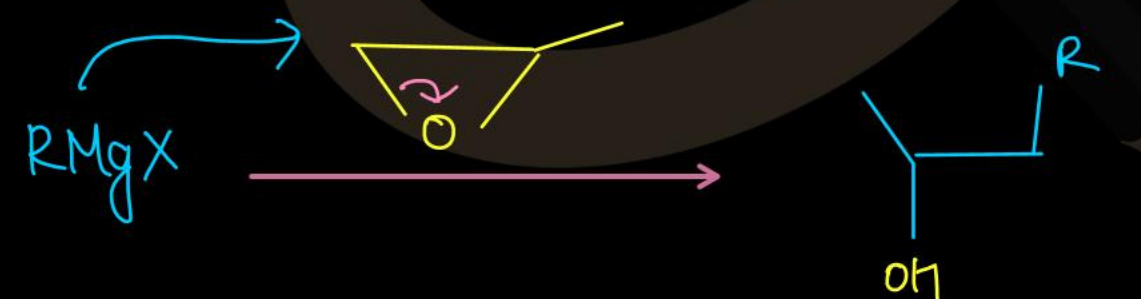


② from Grignard Reagent

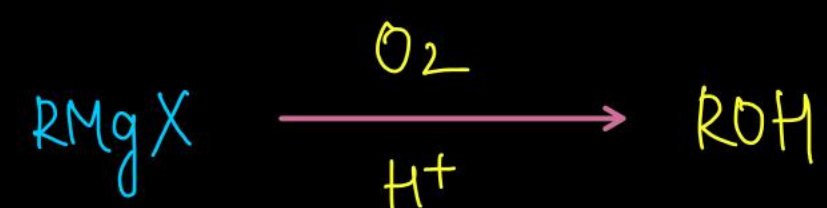
i) from Carbonyl Comp



ii) from Cyclic ethers :-



iii) from O_2/H^+ :-



③ from alkyl halides

i) Solvolysis (SN^1)



ii) aq KOH (SN^2)



④ Reduction Rxn's :-

i) Carbonyl Comp

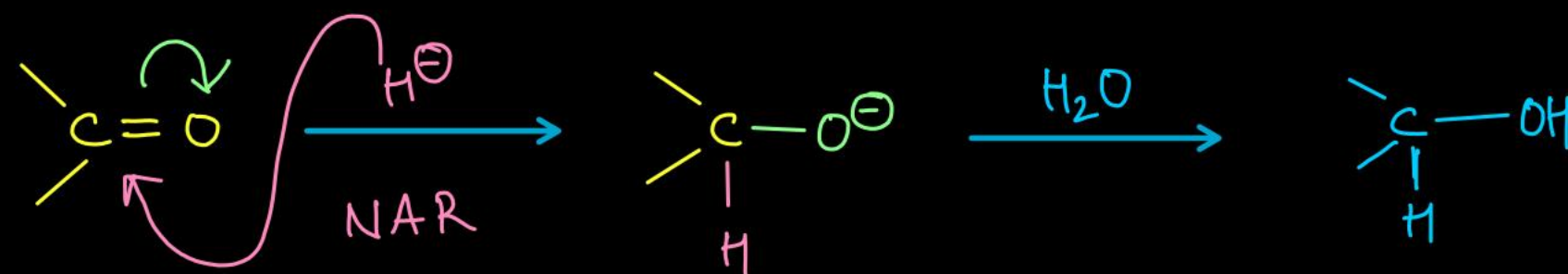
Reagents : 1) LiAlH_4

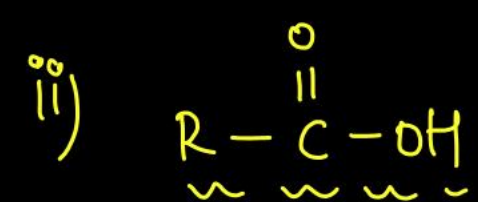
2) NaBH_4

DM :-



Mech :-

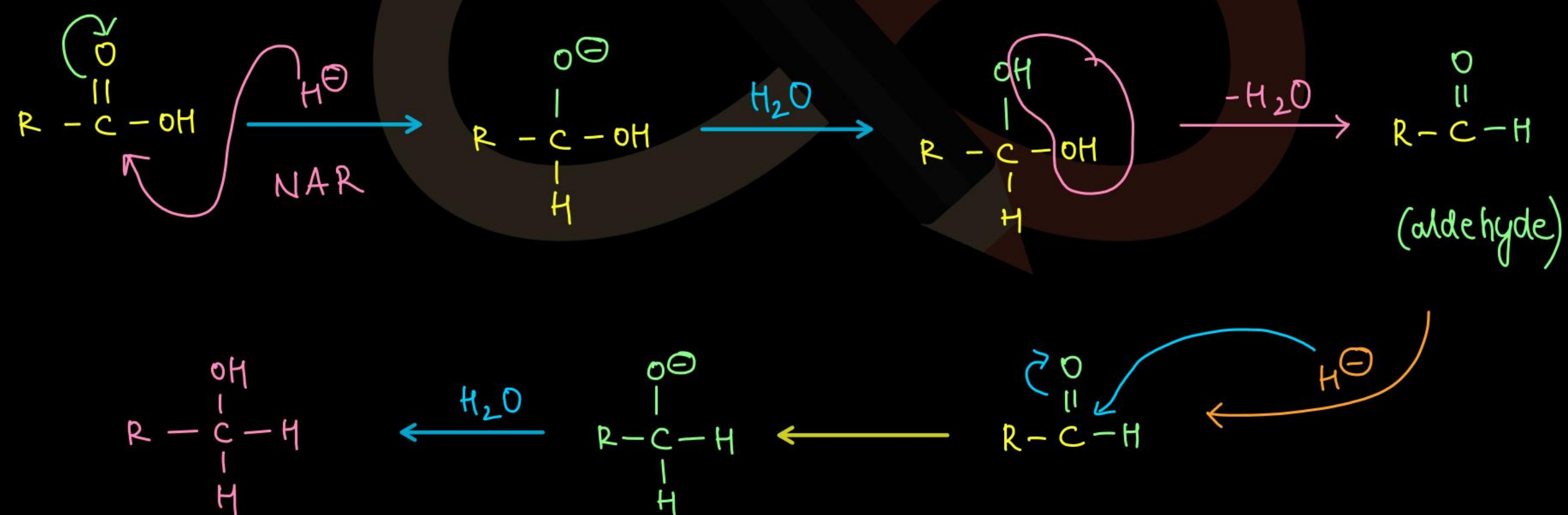




Reagents :- 1) LAH ✓
2) SBH X



Mech :-



iii) Acid chloride:-

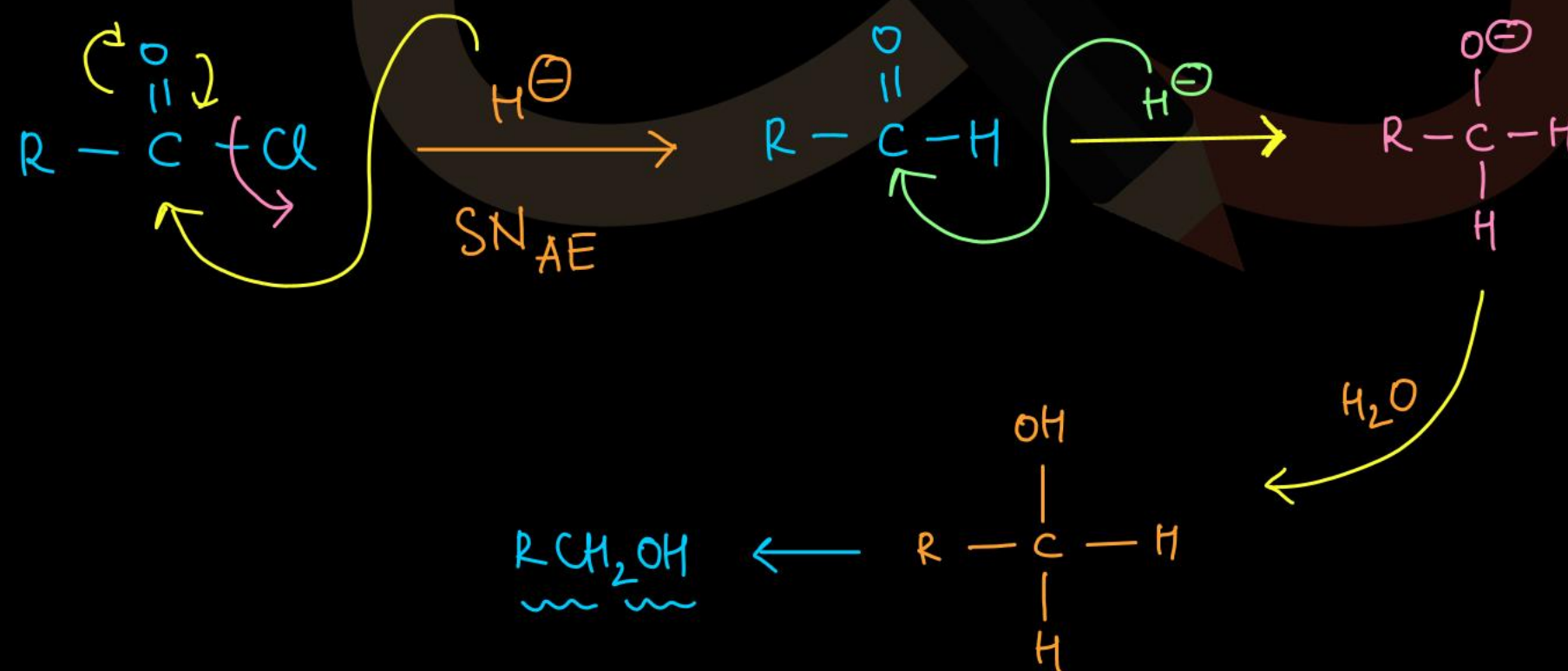
Reagents :-

- 1) LAH ✓
- 2) SBH ✓

DM



Mech :-



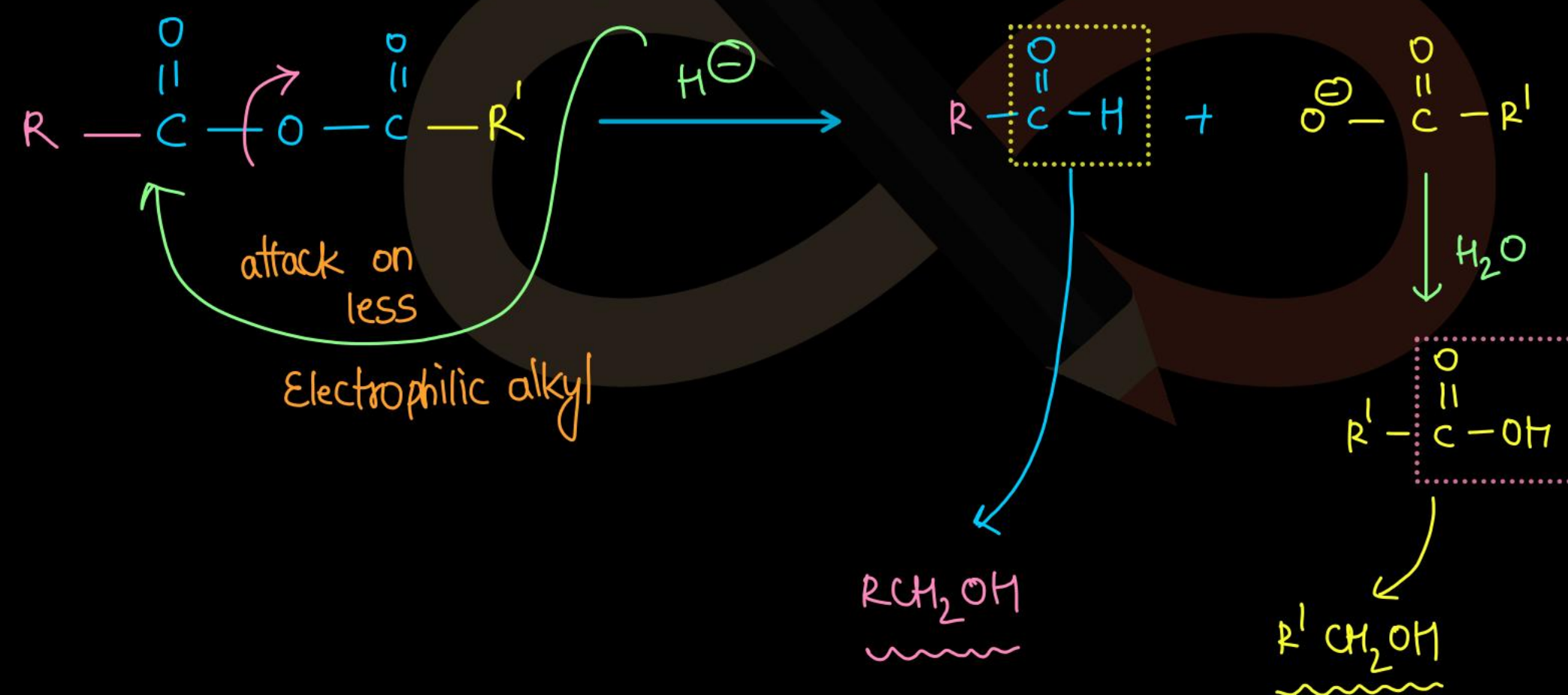
iv) Anhydride:

Reagents:- 1) LAH ✓ SBH ✗

DM:-



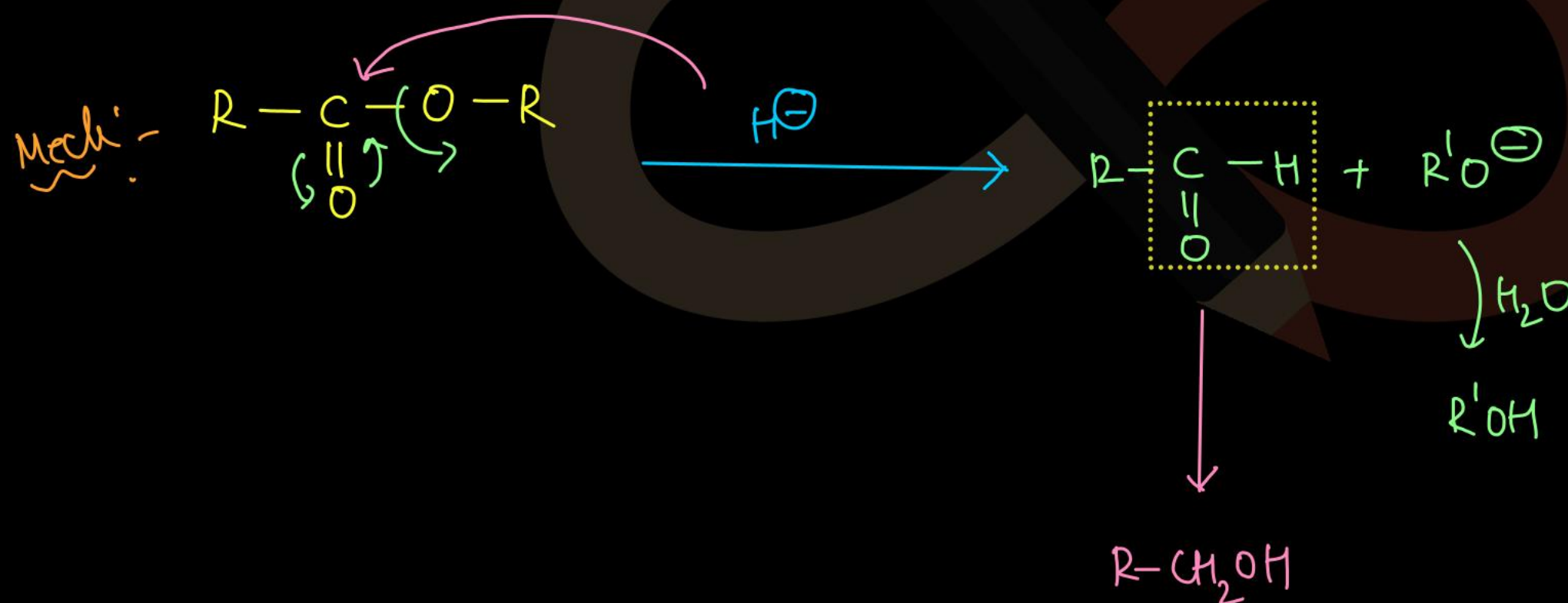
Mech:-



v) ester :

Reagents:- 1) LiAlH_4 ✓
2) SBH ✗

DM:-



v) Amide :



Imp * Amide $\xrightarrow[2) \text{SBH } \gamma]{1) \text{LAH}}$ Amine

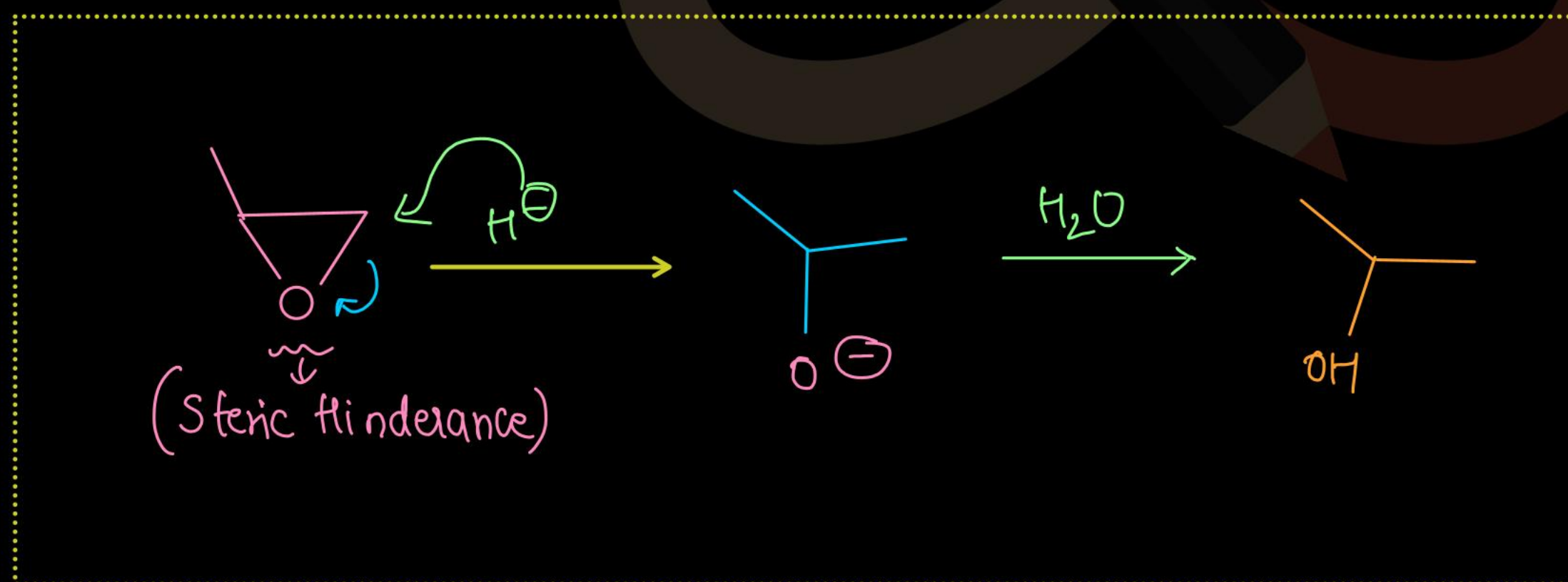


vii) Cyclic ether

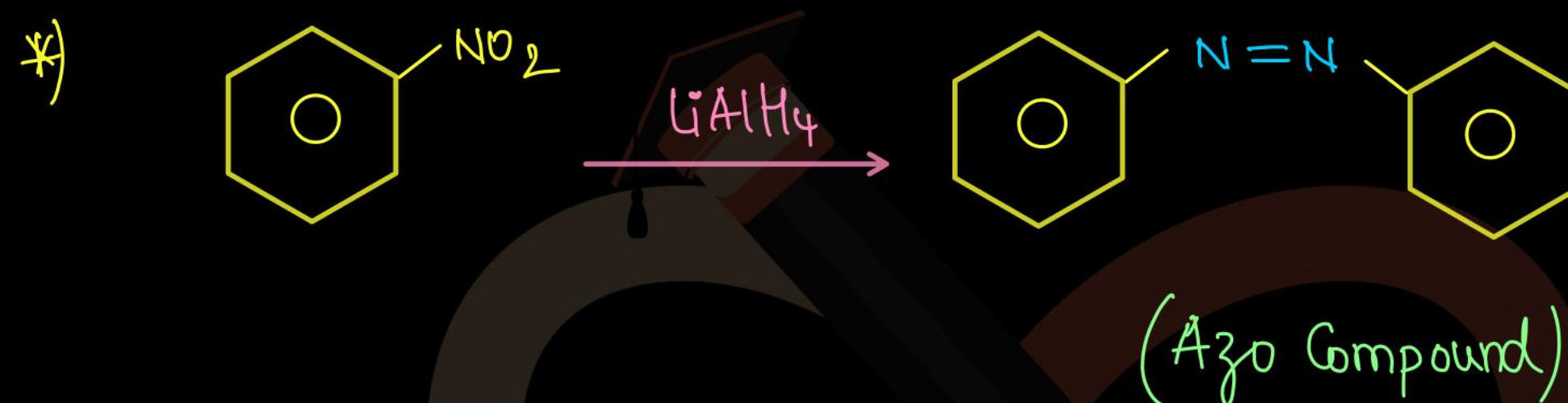
Reagents:- LiAlH_4 ✓
 SBH ✗

(acyclic ether doesn't
react with LAH)

D.M



Special :



*)

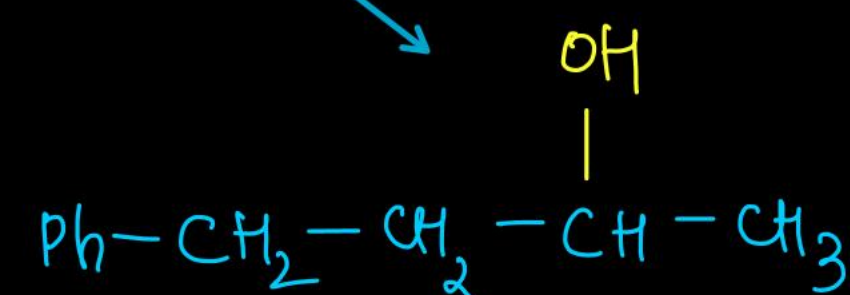
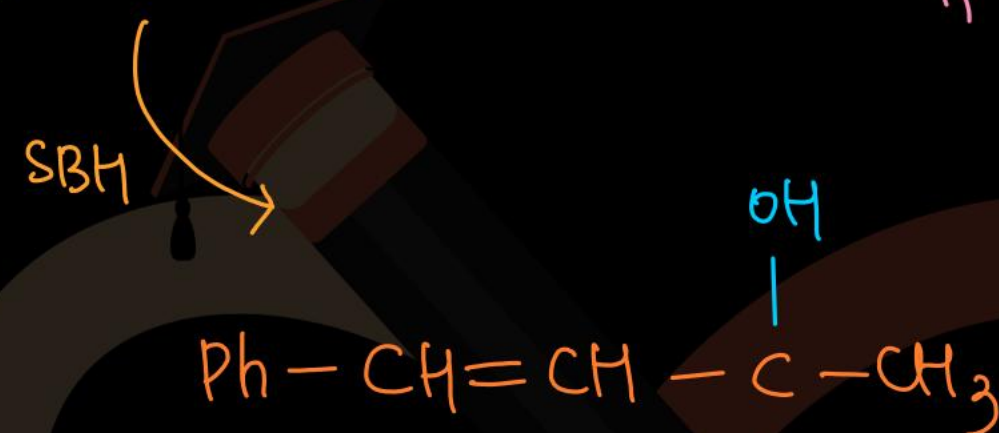
	LAH	SBH
1° R-X	Alkane (SN ²)	-
2° R-X	Alkane (SN ²)	Alkane (SN ₁)
3° R-X	Alkene (E ₂)	Alkane (SN ₁)

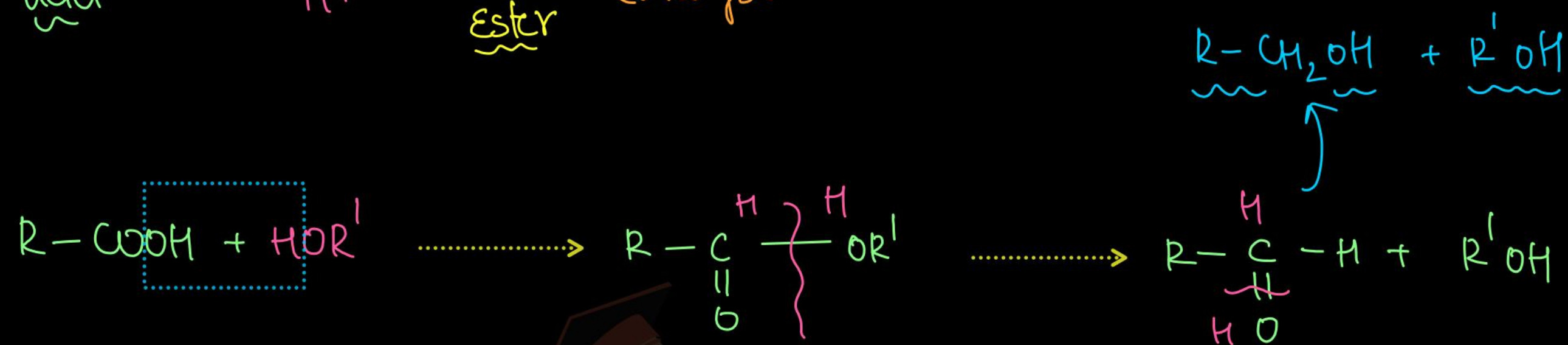
<u>Conversion</u>			LiAlH_4	NaBH_4
$\text{R}-\text{CHO}$	$\longrightarrow$	$\text{R}-\text{CH}_2\text{OH}$	✓	✓
$\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R}'$	$\longrightarrow$	$\text{R}-\overset{\text{OH}}{\underset{ }{\text{CH}}}-\text{R}'$	✓	✓
$\text{R}-\text{COOH}$	$\longrightarrow$	$\text{R}-\text{CH}_2\text{OH}$	✓	✗
$\text{R}-\text{COCl}$	$\longrightarrow$	$\text{R}-\text{CH}_2\text{OH}$	✓	✓
$\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R}'$	$\longrightarrow$	$\text{R}-\text{CH}_2\text{OH} + \text{R}'\text{CH}_2\text{OH}$	✓	✗
$\text{R}-\text{COOR}'$	$\longrightarrow$	$\text{RCOOH} + \text{R}'\text{OH}$	✓	✗
$\text{R}-\triangle_{\text{O}}$	$\longrightarrow$	$\text{R}-\underset{\text{OH}}{\underset{ }{\text{CH}}}-\text{CH}_3$	✓	✗
$\text{*}) } \text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$	$\longrightarrow$	$\text{R}-\text{CH}_2-\text{NH}_2$	✓	✗
$\text{R}-\text{NO}_2$	$\longrightarrow$	$\text{R}-\text{NH}_2$	✓	✗
$\text{Ph}-\text{NO}_2$	$\longrightarrow$	$\text{Ph}-\text{N}=\text{N}-\text{Ph}$	✓	✗
$\text{*}) } \text{R}-\text{X}$	$\longrightarrow$	$\text{R}-\text{H}$	✓	✓

Note:-

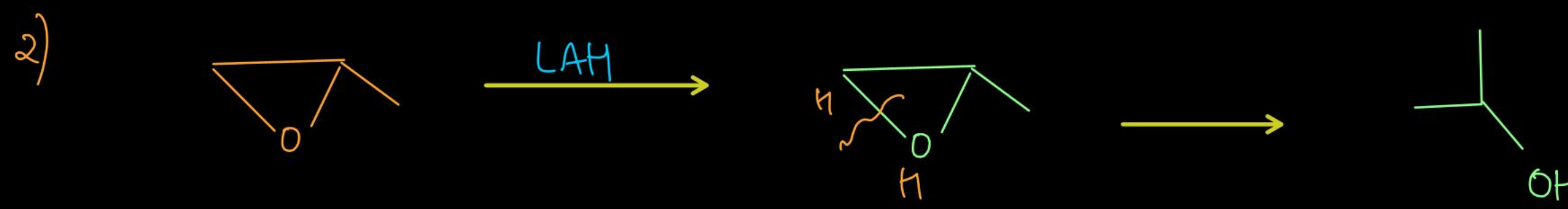
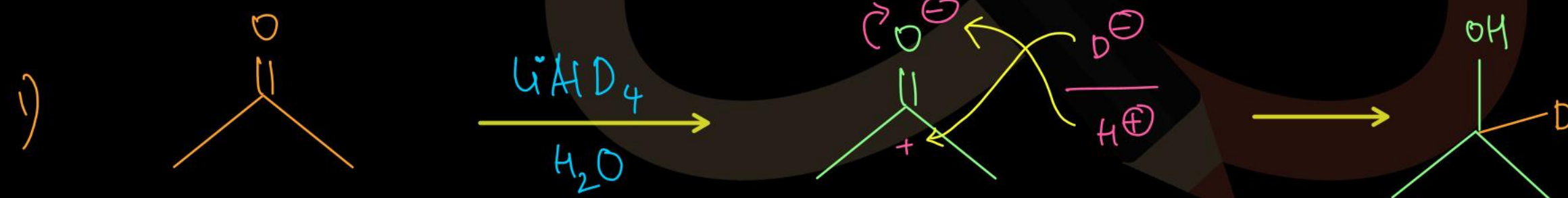
i) If alkene is present in b/w $\overset{\text{O}}{\parallel}{\text{C}}$ and $-\text{Ph}$ then it will be reduced by LiAlH_4

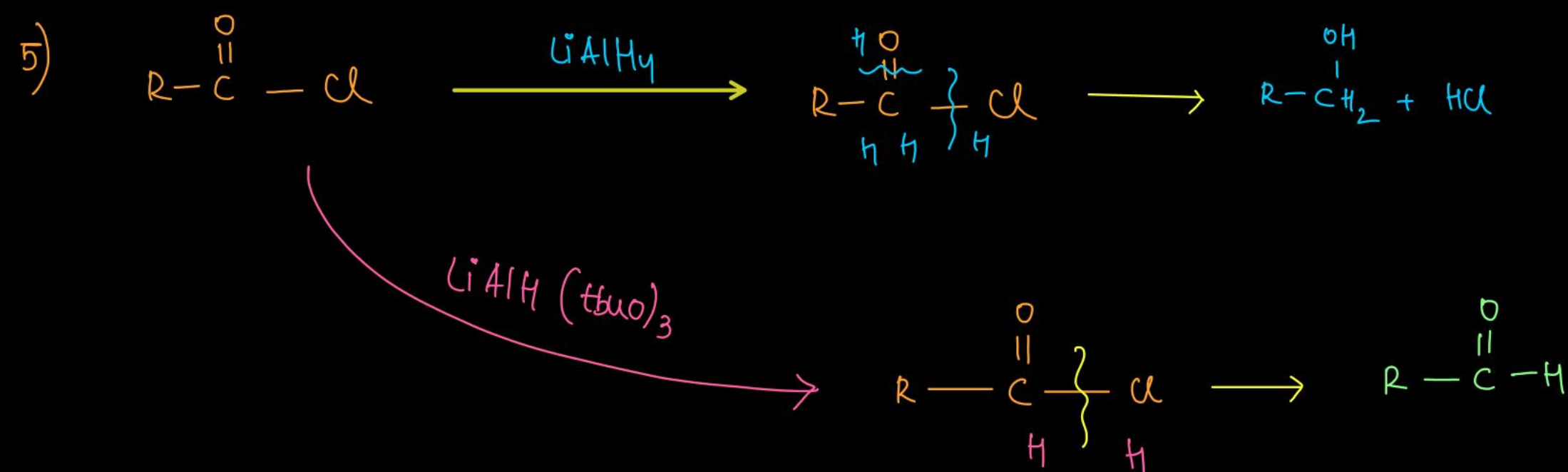
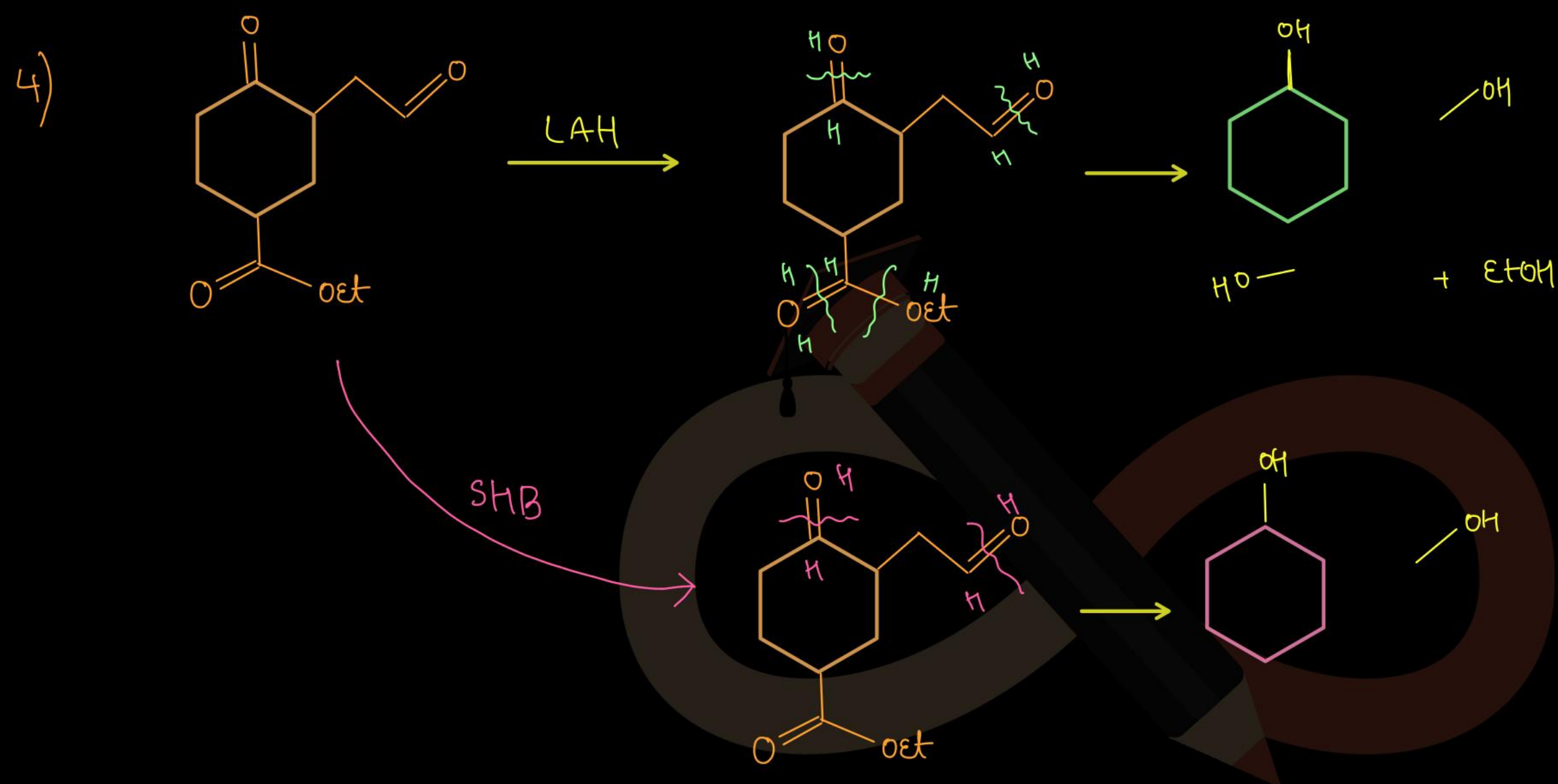
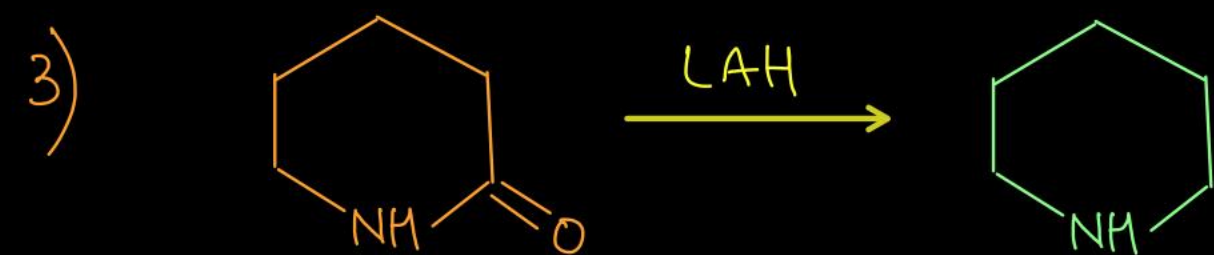
Ex:-





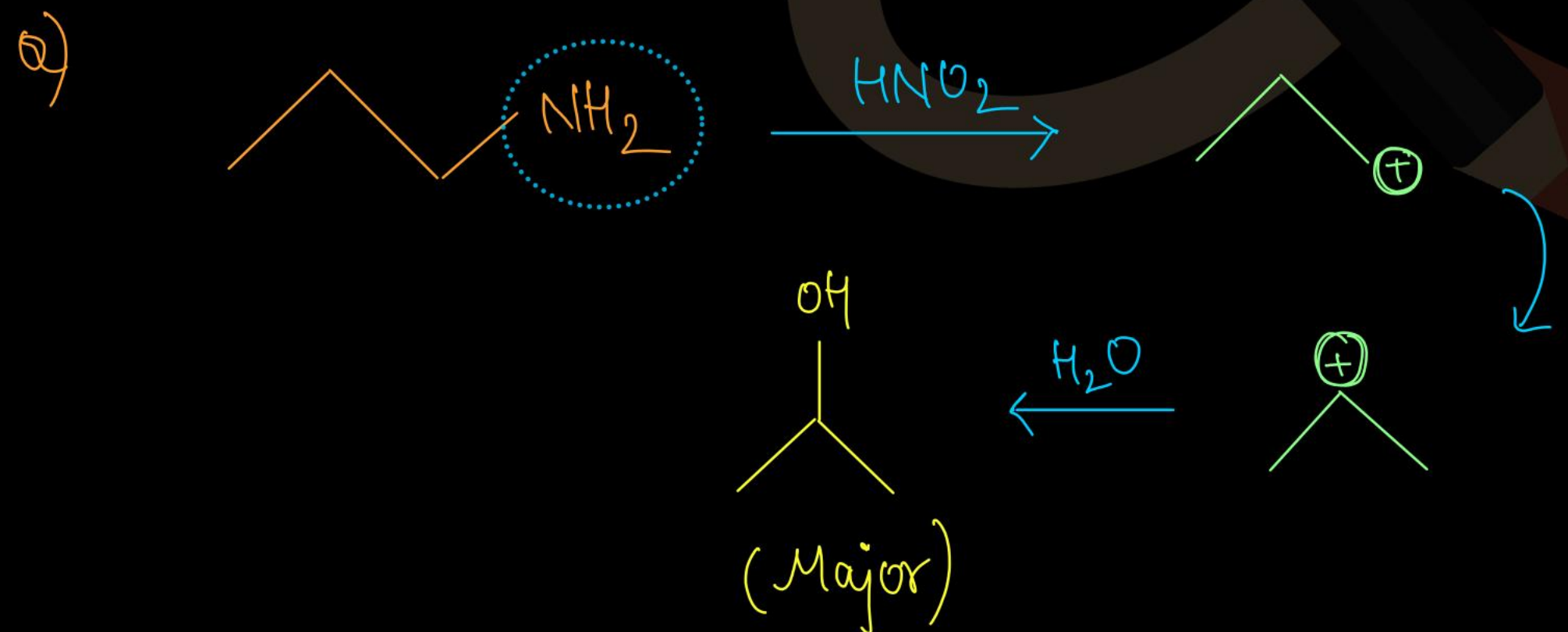
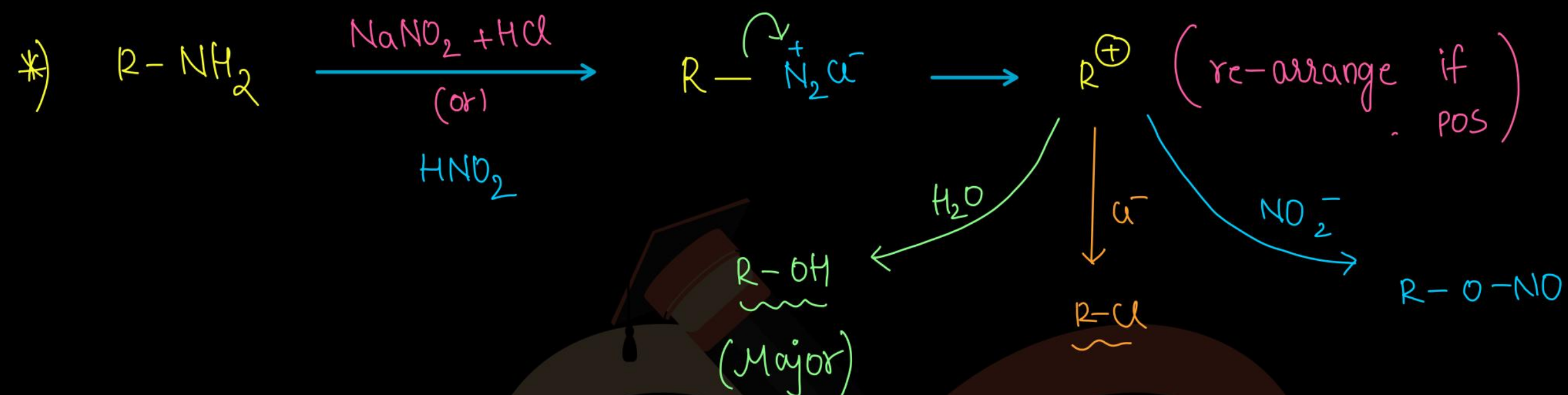
Practice :-



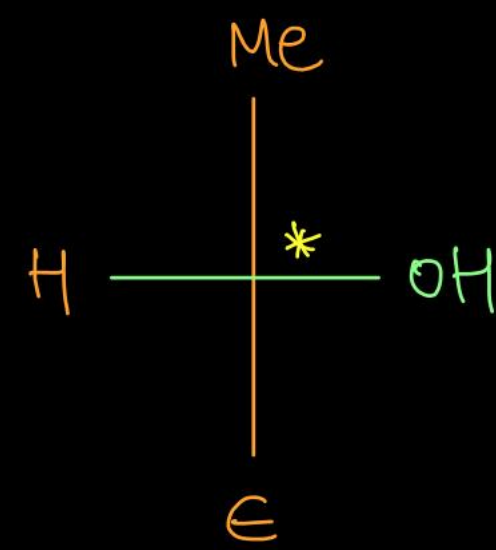
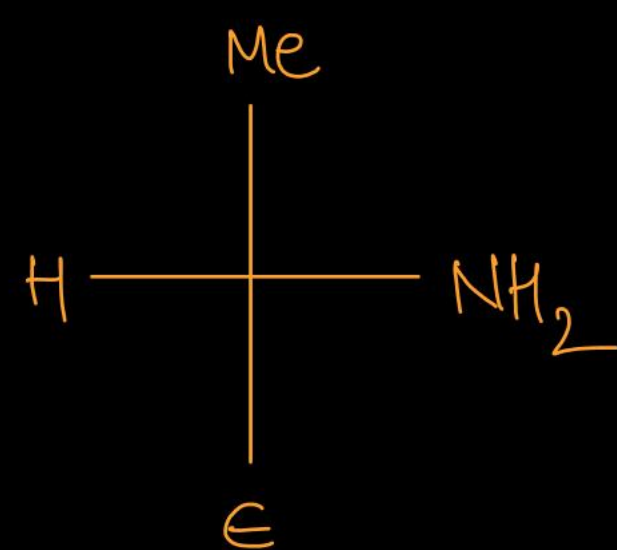


MOP:-

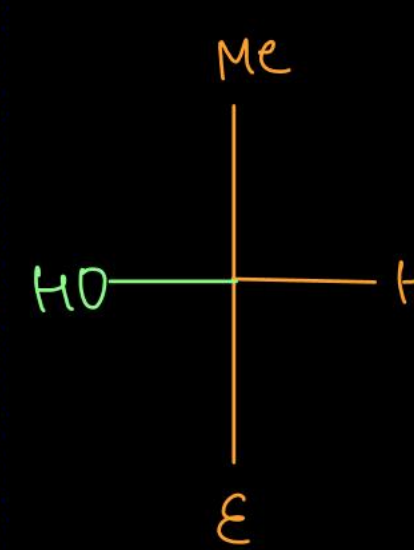
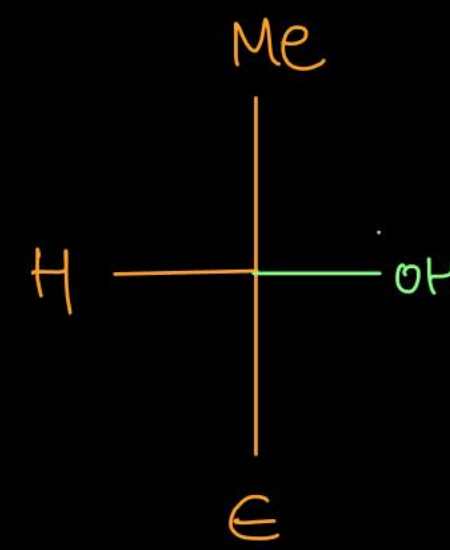
⑤ from 1° aliphatic amines



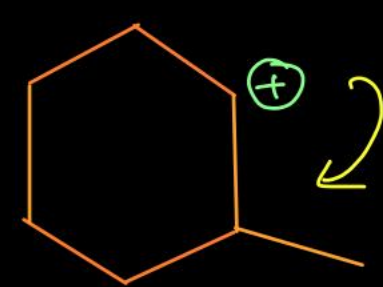
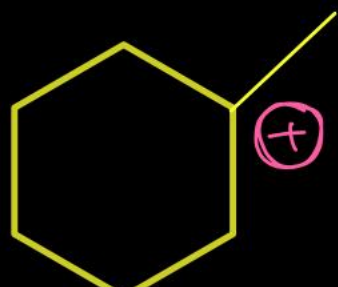
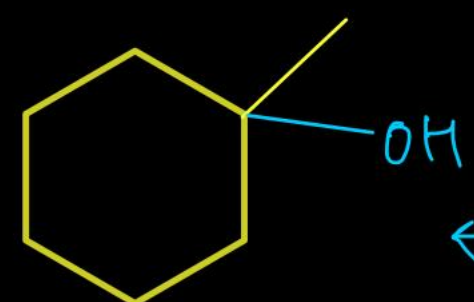
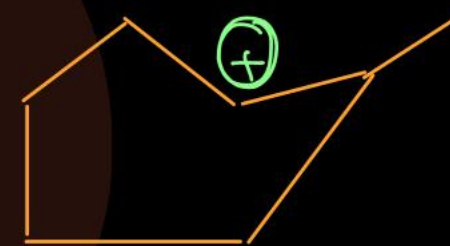
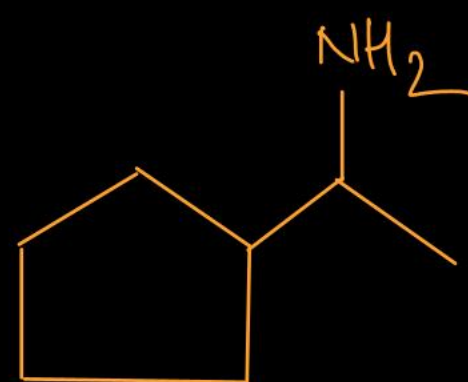
Q)

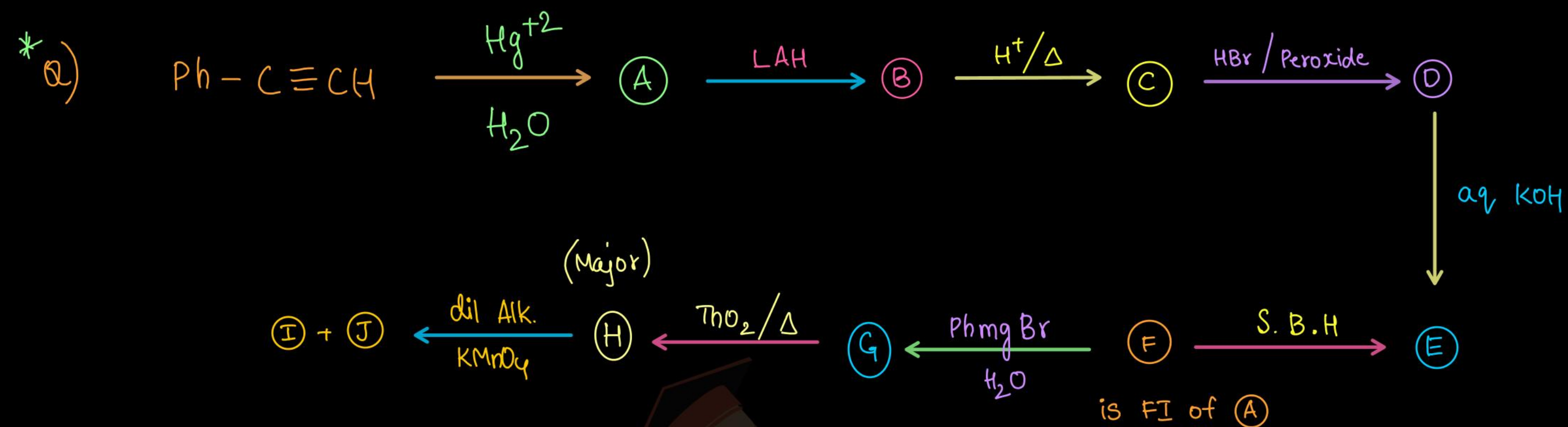


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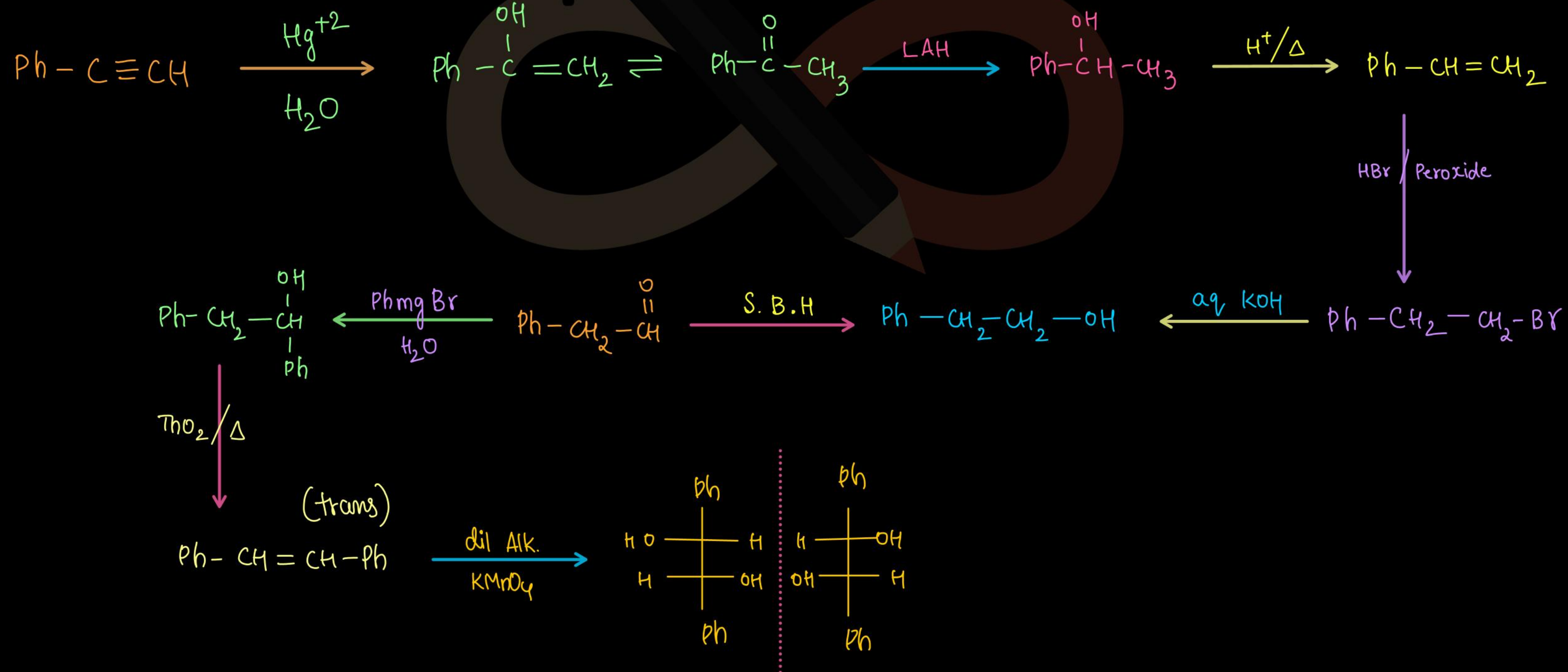


Q)

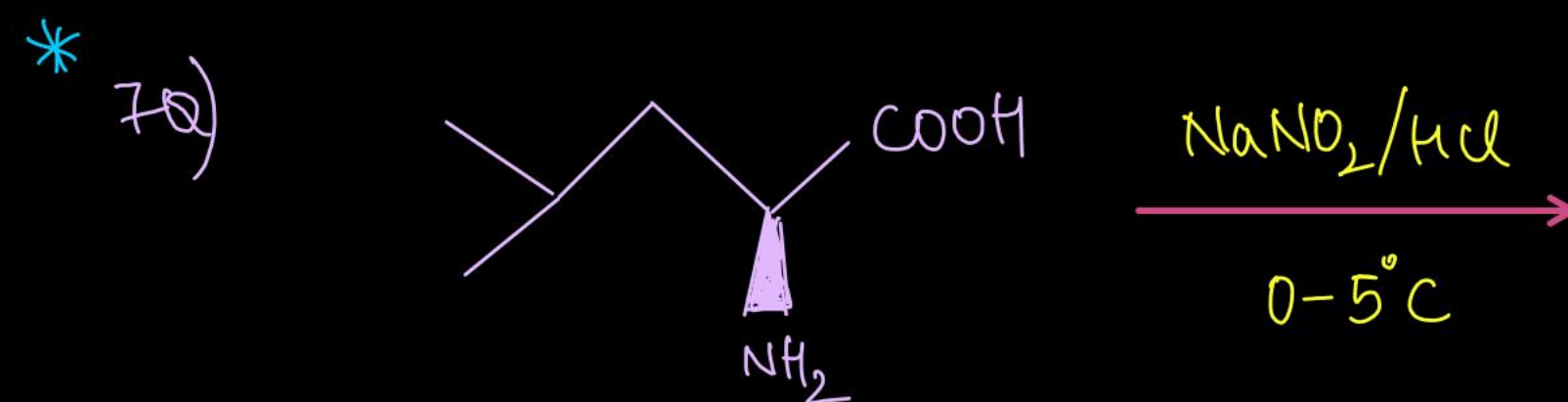
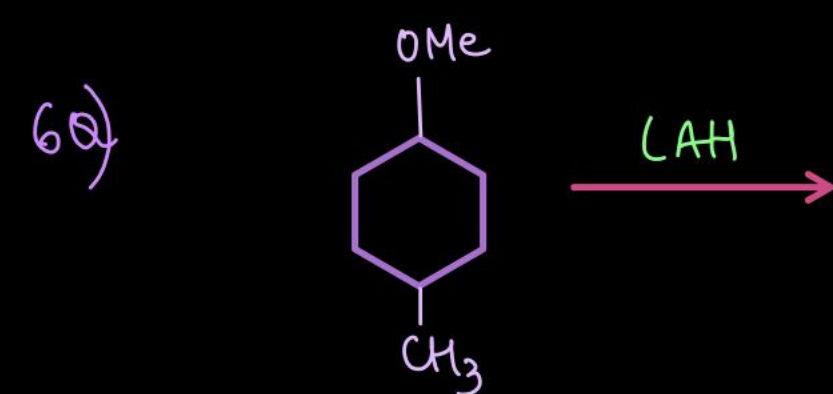
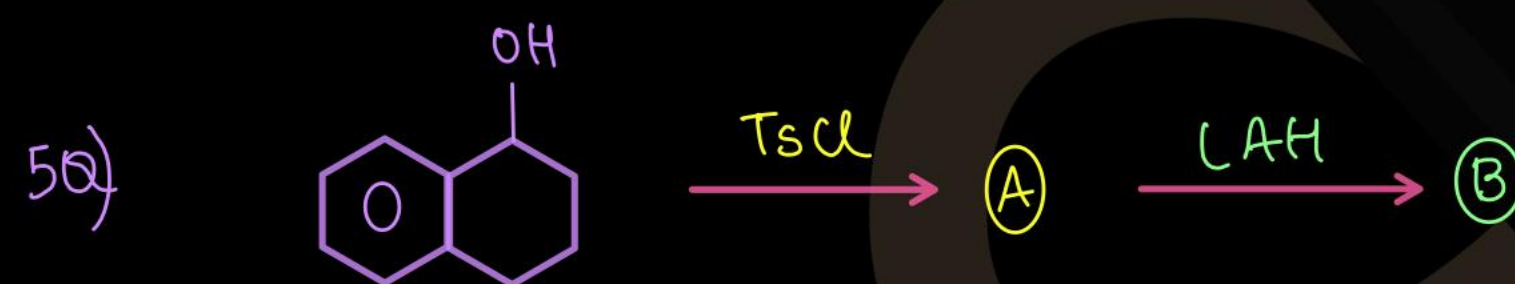
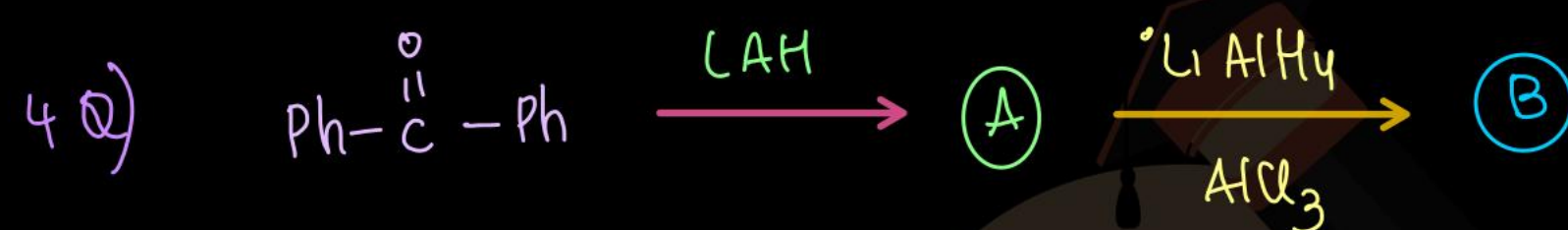


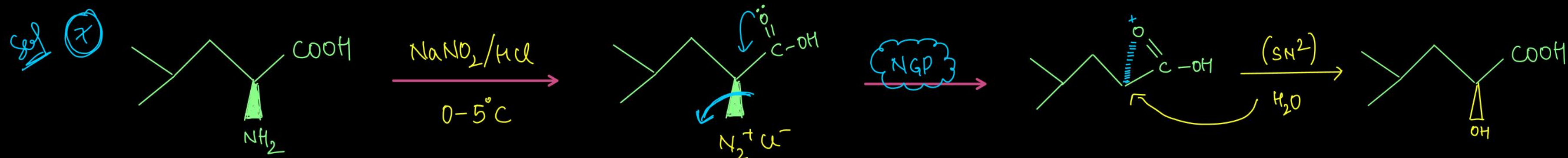
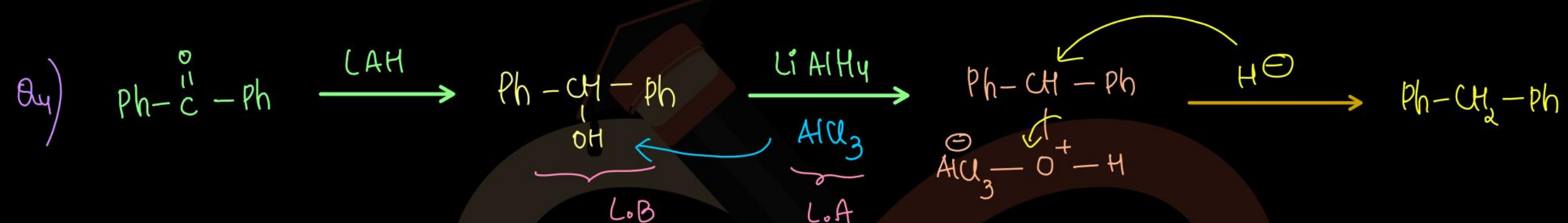
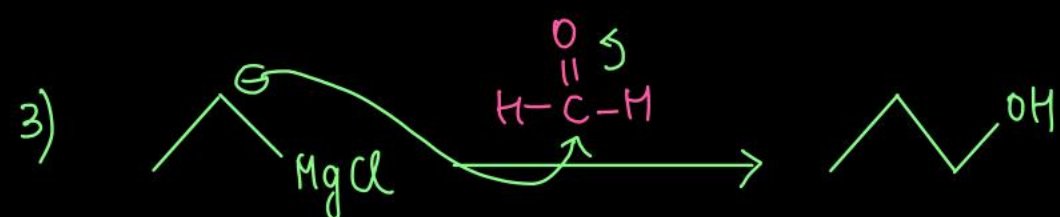
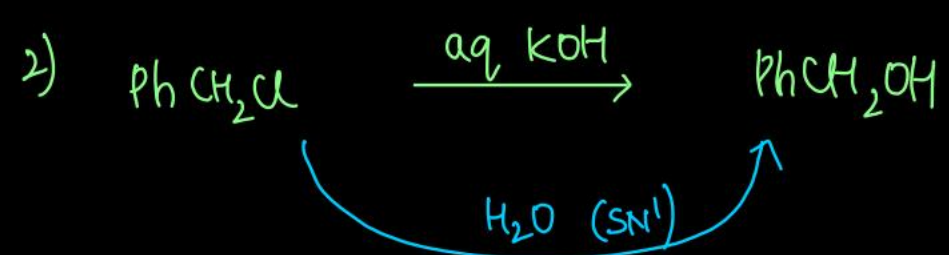
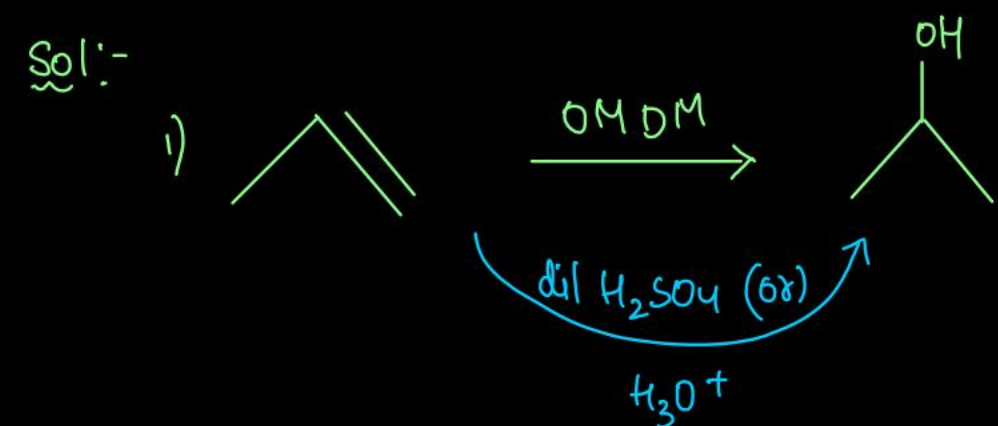


Sol.:-



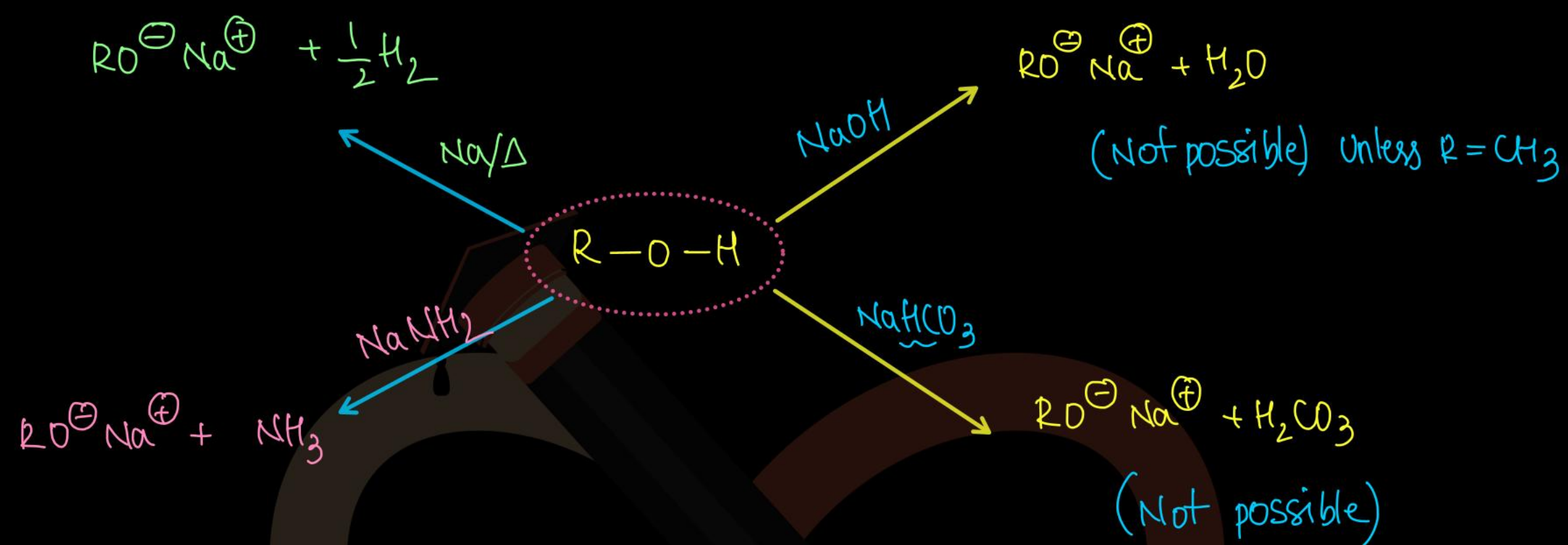
Q) Convert :





Properties

1) Acidic Nature :



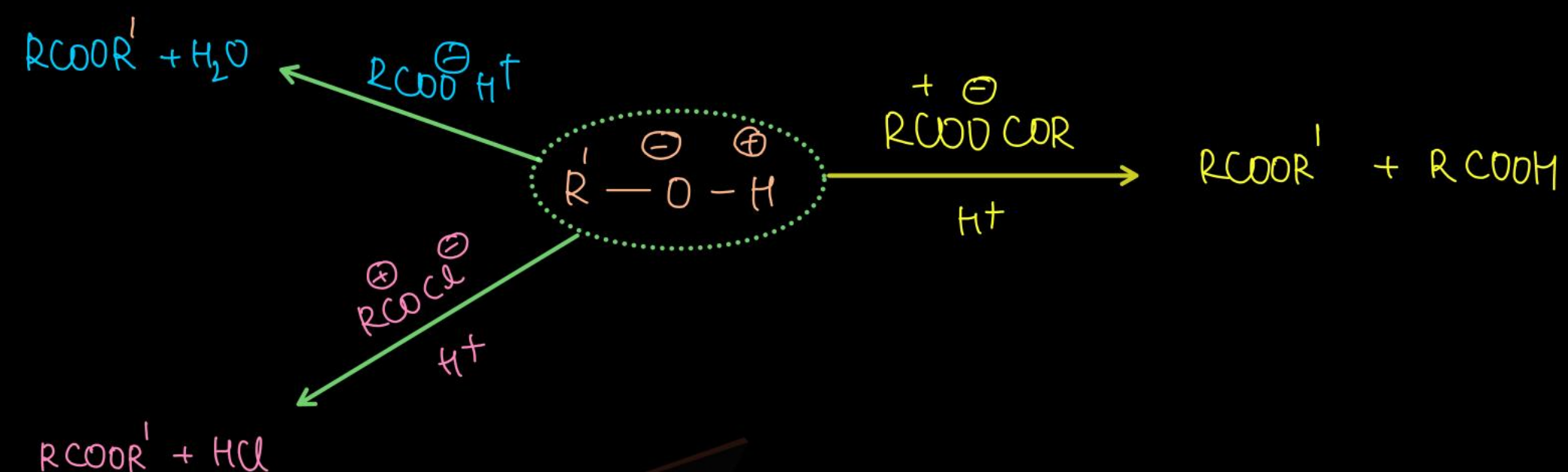
*) rxn will proceed only if product is weak acid than $\text{R}-\text{OH}$

*) $\text{H}_2\text{O} > \text{R}-\text{OH}$ (acidic strength)

*) $\text{H}_2\text{CO}_3 > (\text{R}-\text{OH})$ "

*) $\text{H}_2\text{O} < \text{CH}_3-\text{OH}$ (Methanol is more acidic)

2) Esterification :-



Mech :-



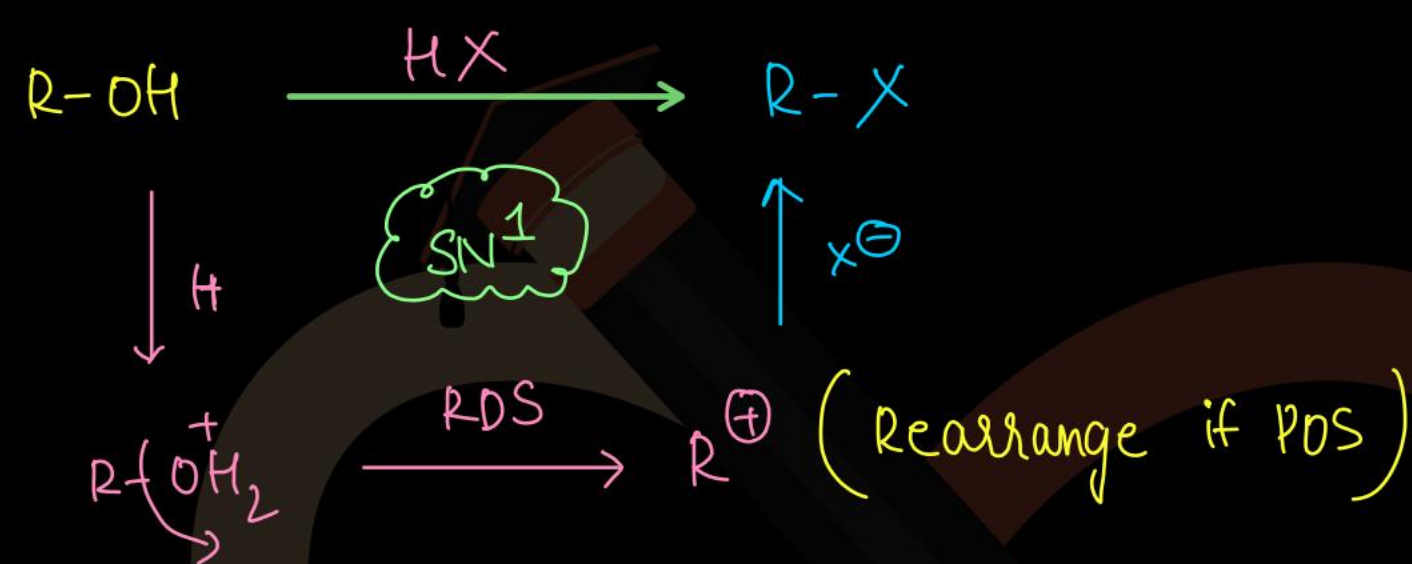
*) R.O.R $\propto$ Electrophilicity of $\text{C}^\oplus$ ($\text{R}-\text{COOH}$)
 $\propto$ Nucleophilicity of ROH

Q) Practice : Compare rate of Esterification





③ Rxn with R-X :



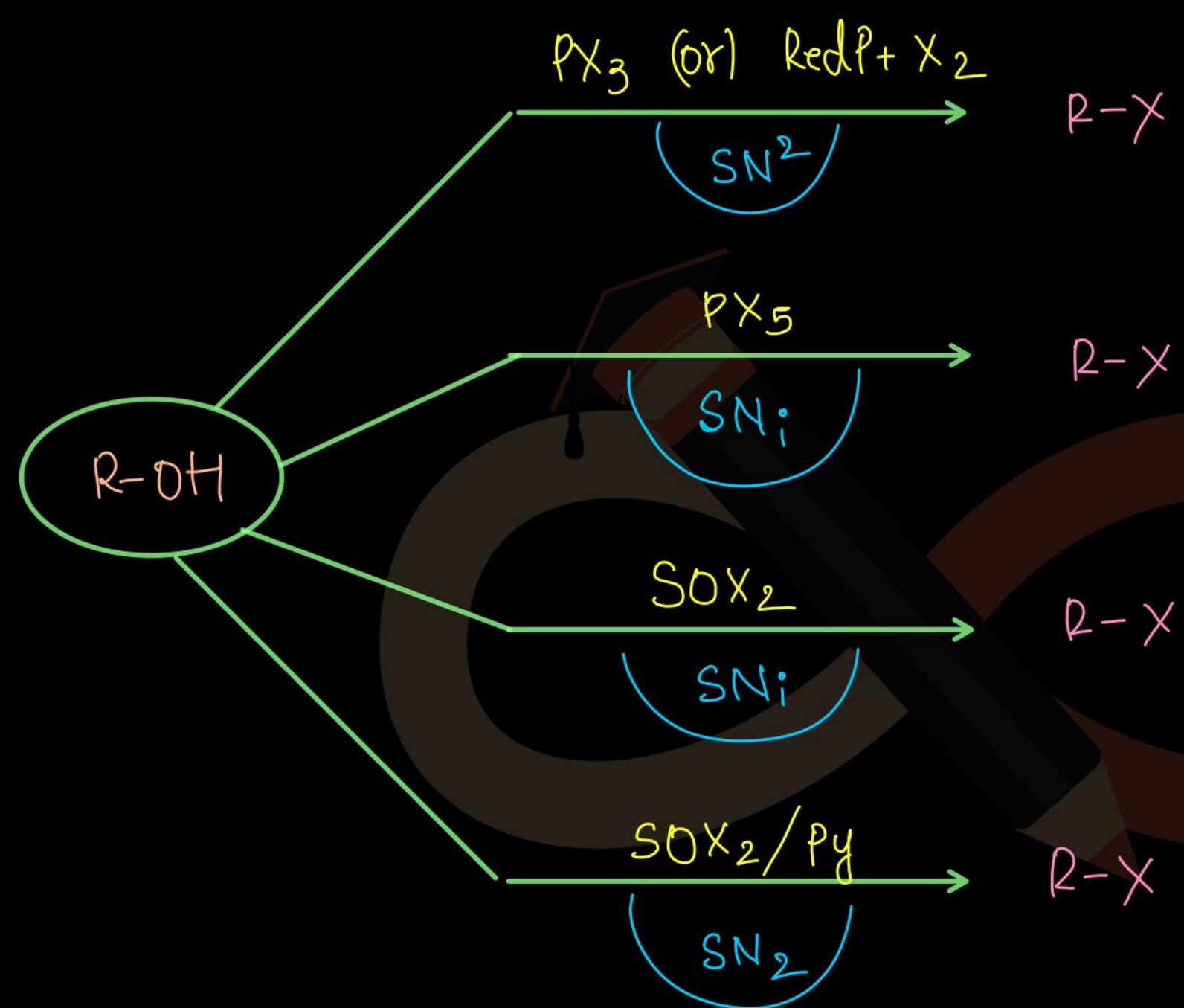
Lucas test :- (Conc HCl + anhyd ZnCl_2)

*) 1° R-OH - SN^2 — No turbidity (long time)

*) 2° R-OH - SN^2 — Turbidity in min

*) 3° R-OH
 $1^\circ, 2^\circ$ res
 stabilised } SN^1 — Turbidity in seconds

④ Rxn with PX₃, PX₅, SOX₂ :-



⑤ Dehydration

ϵ_1

- 1) Conc H_2SO_4 , Δ
- 2) Conc H_3PO_3 , Δ
- 3) KHSO_4 , Δ

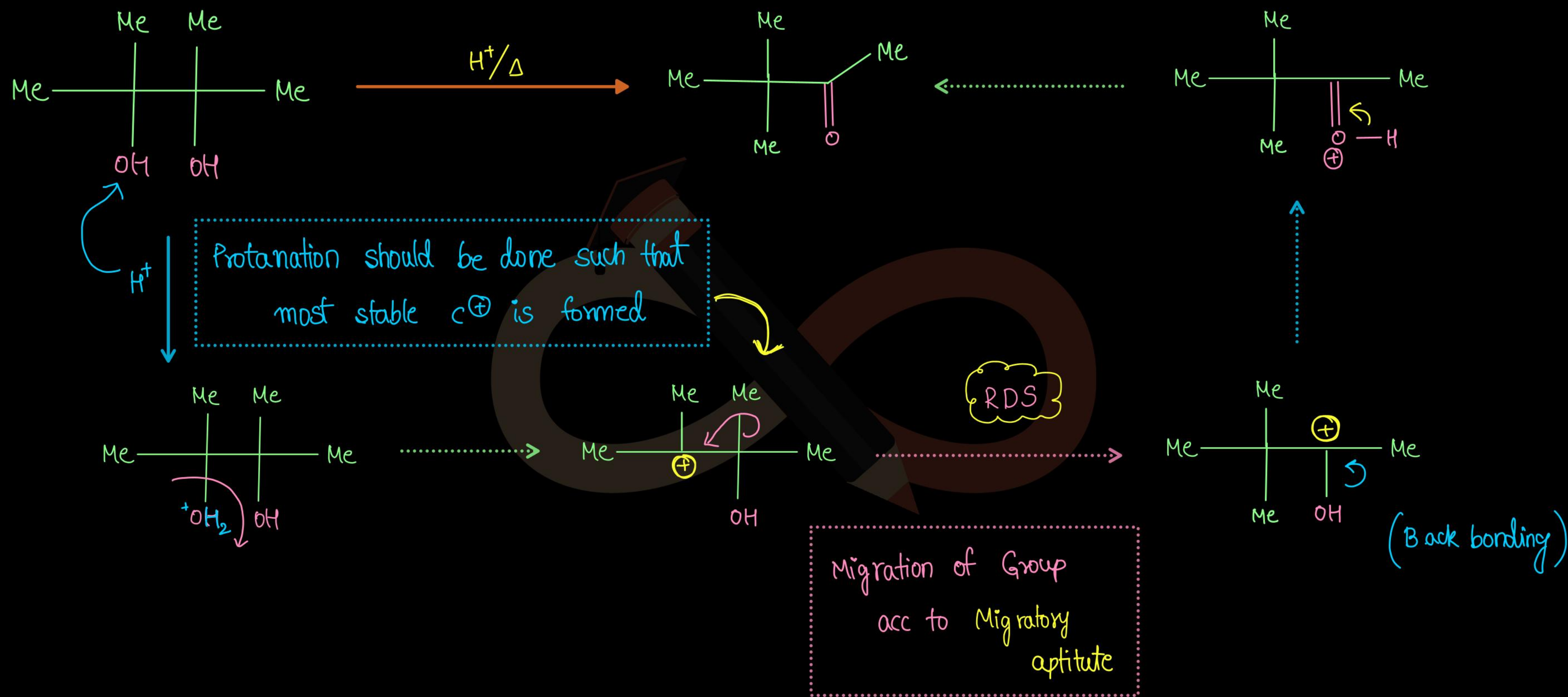
ϵ_{1cb}

- 1) $\text{Th}_2\text{O} / \Delta$

ϵ_2

- 1) Al_2O_3 , Δ
- 2) P_2O_5 , Δ
- 3) POCl_3 , Δ

⑥ Pinacol-Pinacolone - Rearrangement



Migratory aptitude :-

* $H > Ph > R$

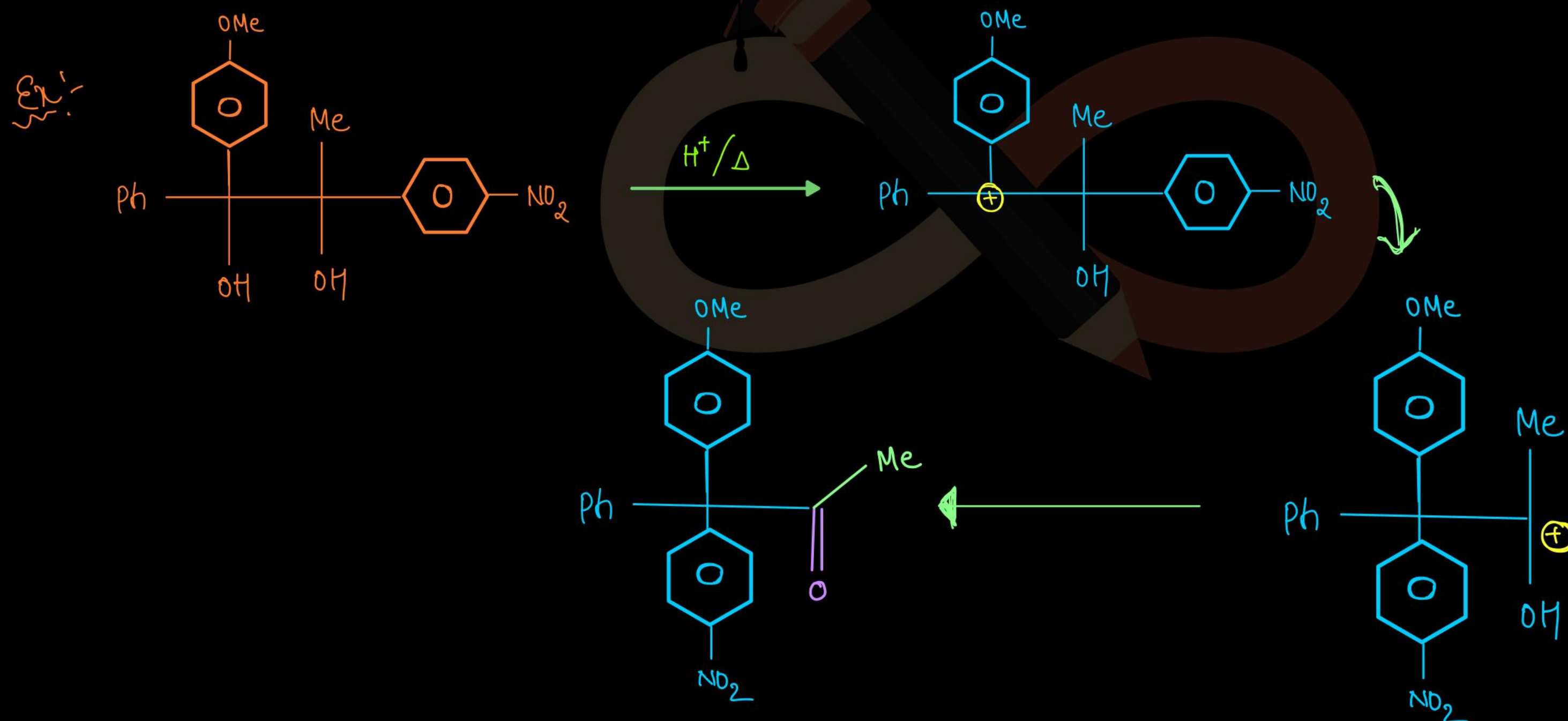
$H > D > T$



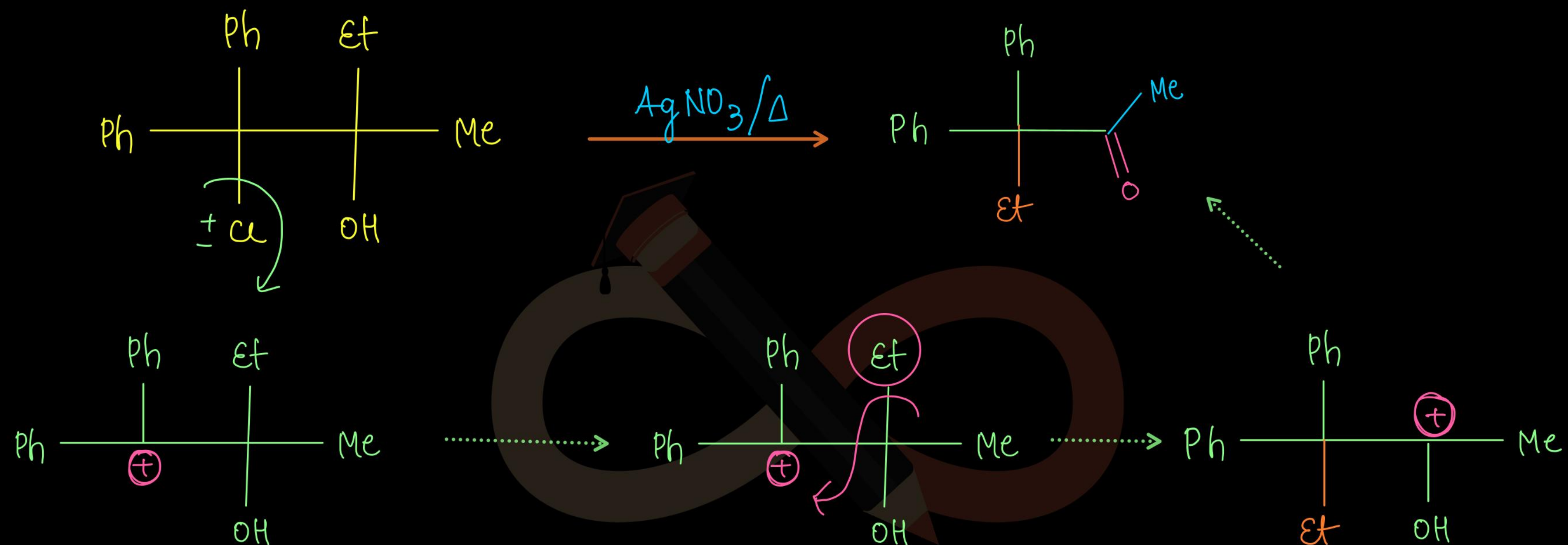
$+M > \text{Neutral} > -M$

$3^\circ > 2^\circ > 1^\circ$

(no. of carbons) $\uparrow$

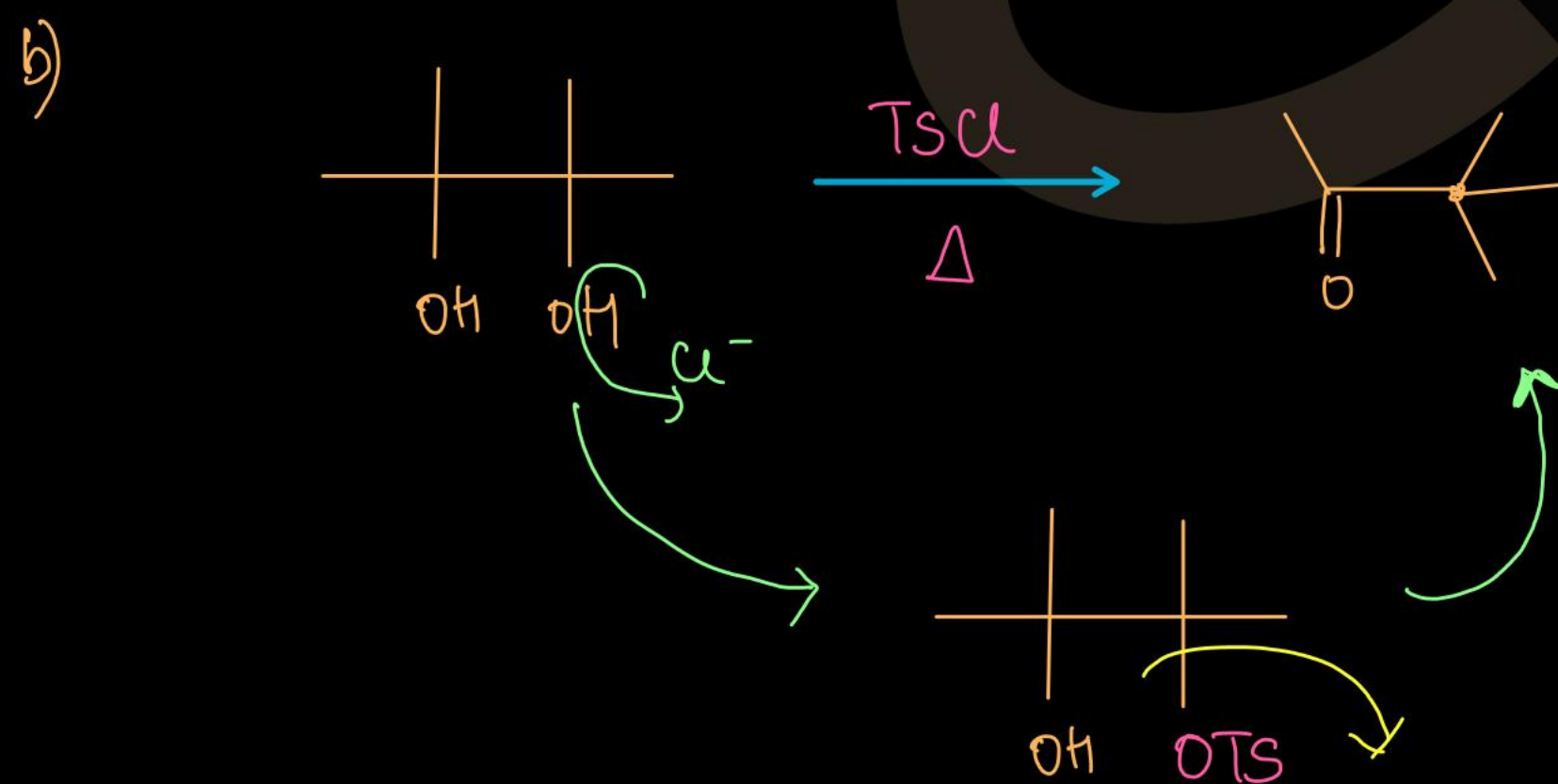
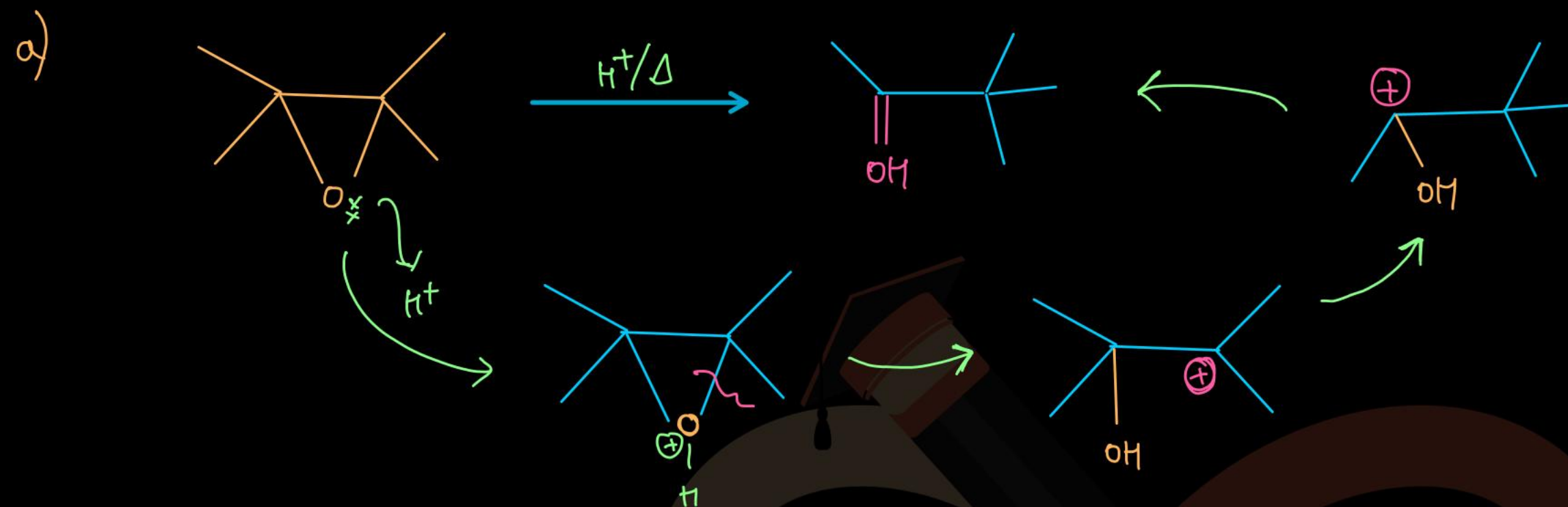


Special ① Semi pinacol

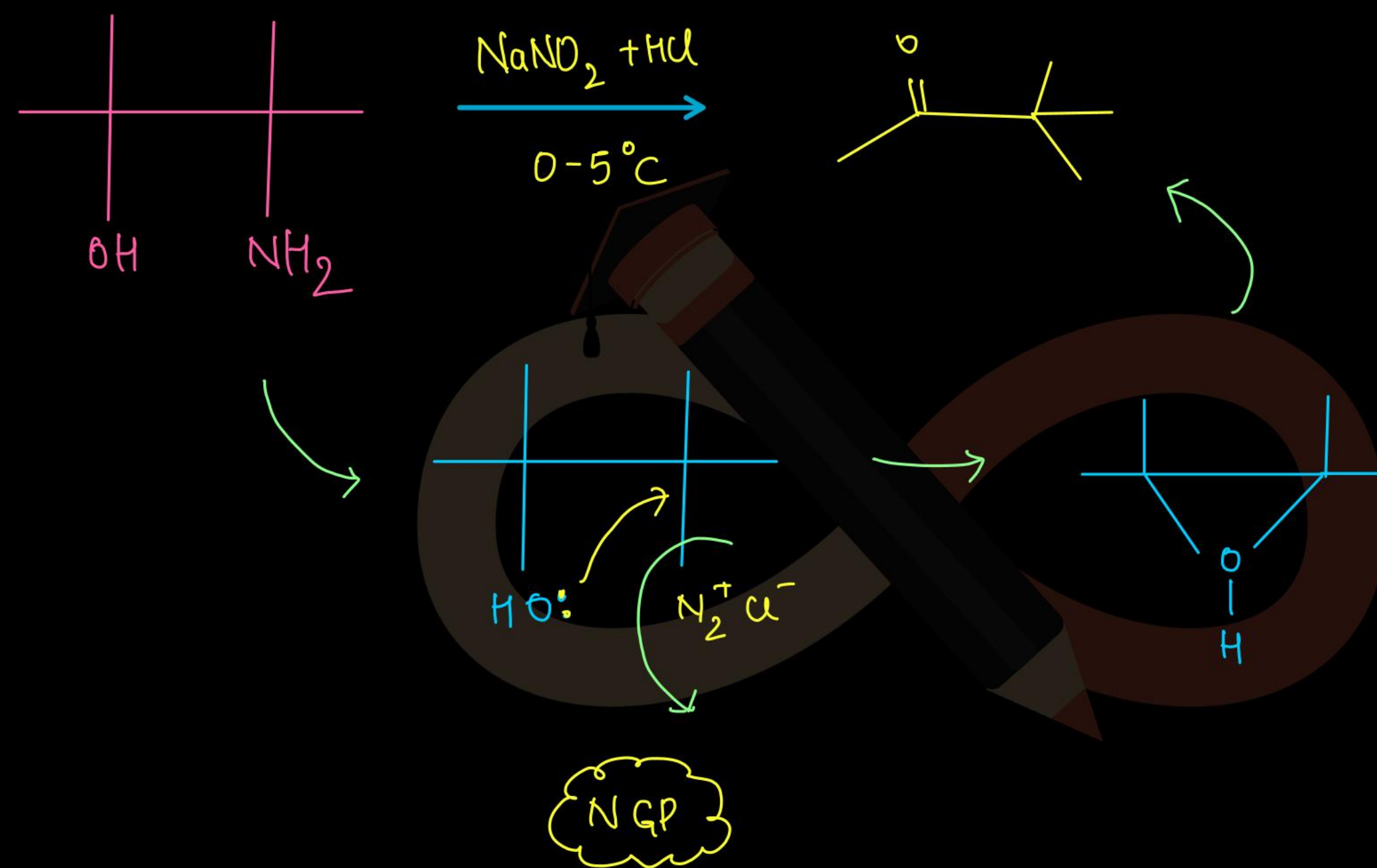


(no. of carbons $\uparrow$ Migratory AP $\uparrow$)

② Pinacol fashion

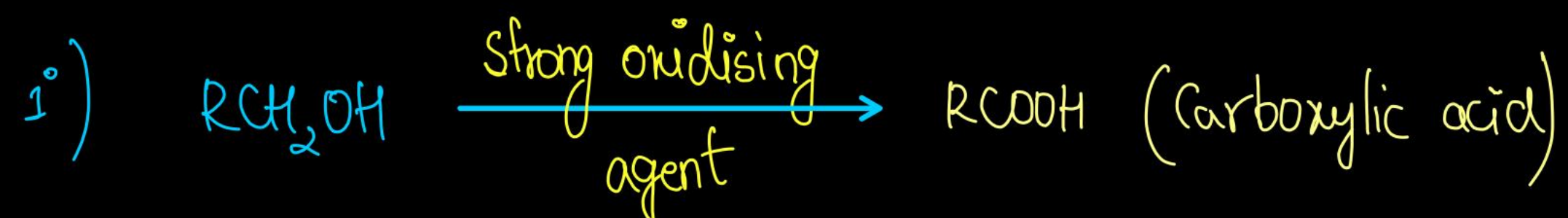
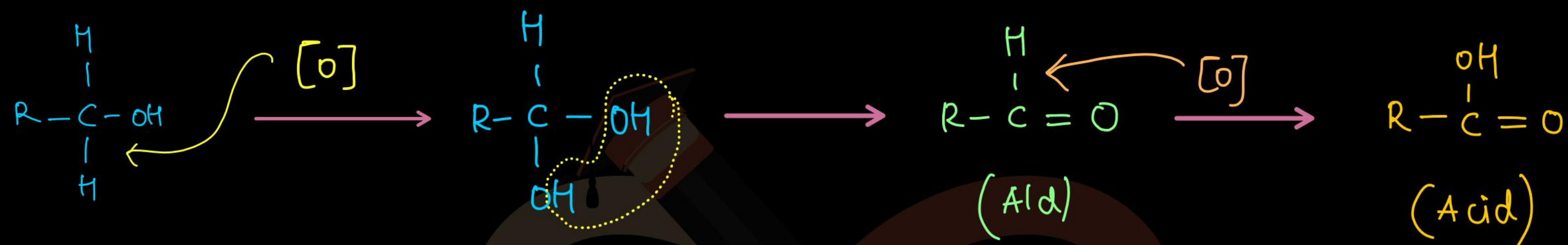


③ Pinacol diazotisation :

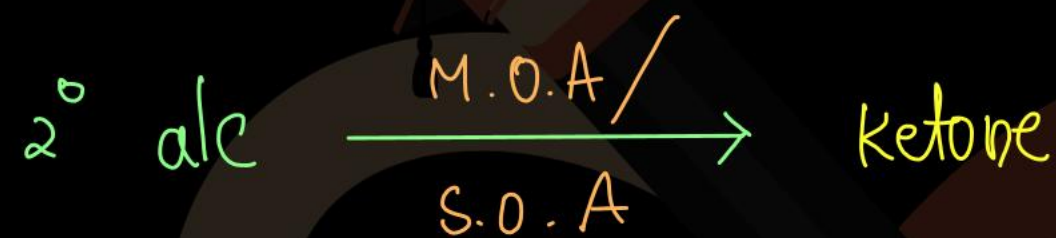
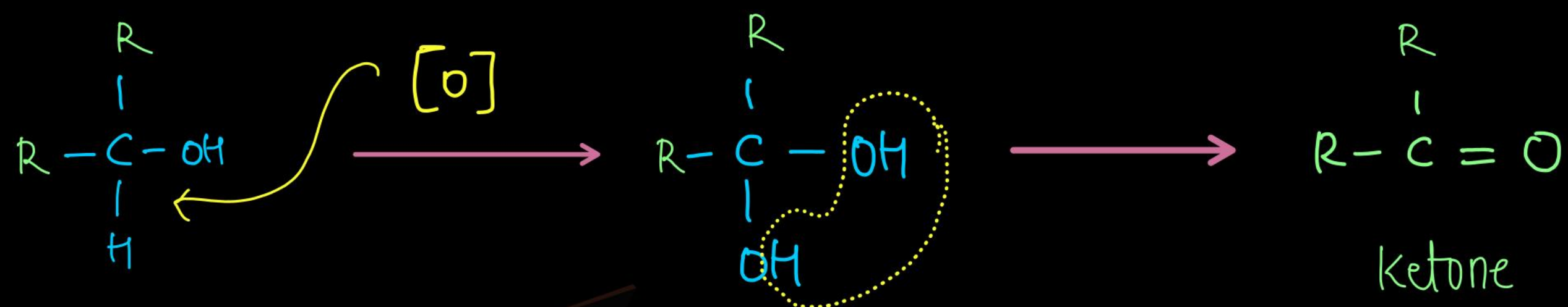


⑦ Oxidation :

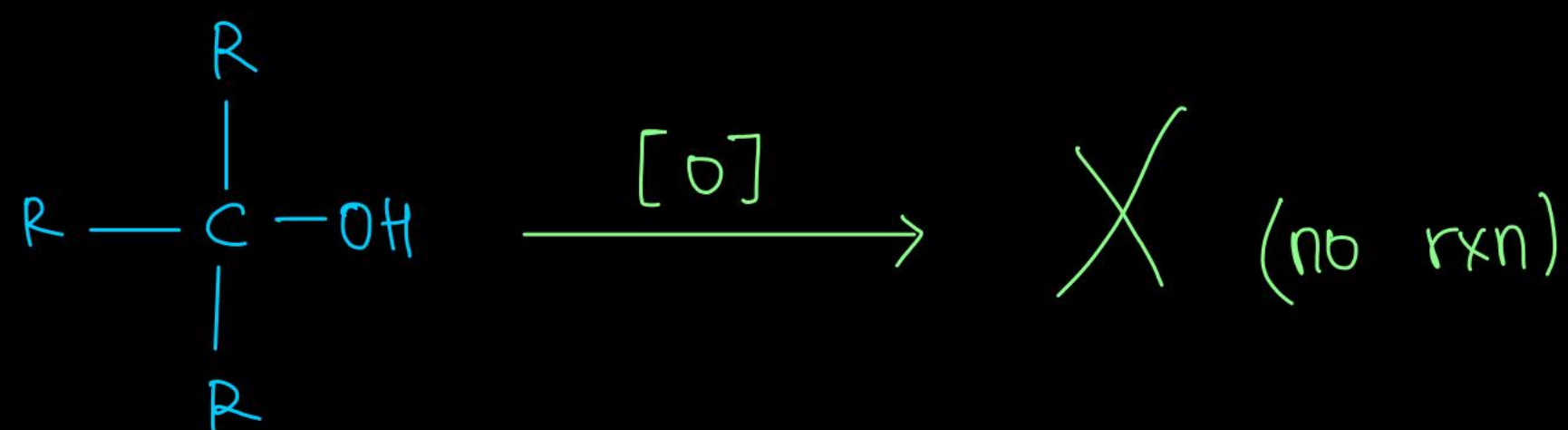
a) 1°-alcohol :-



2° alcohol:-



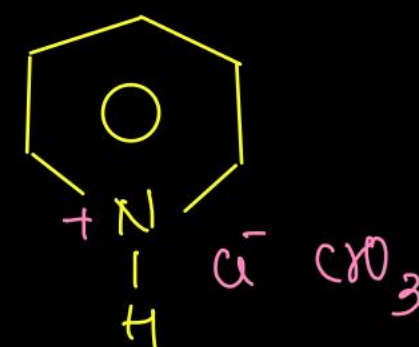
3° alcohol :



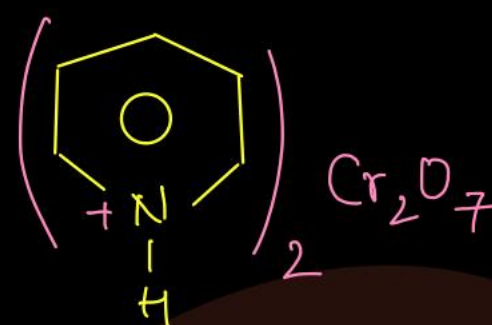
* Oxidising agents :-

a) Mild O.A :-

i) PCC (Pyridinium chloro chromate)



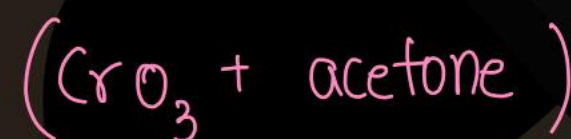
ii) PDC (Pyridinium di chromate)



iii) Collins' reagent



iv) Jones' reagent

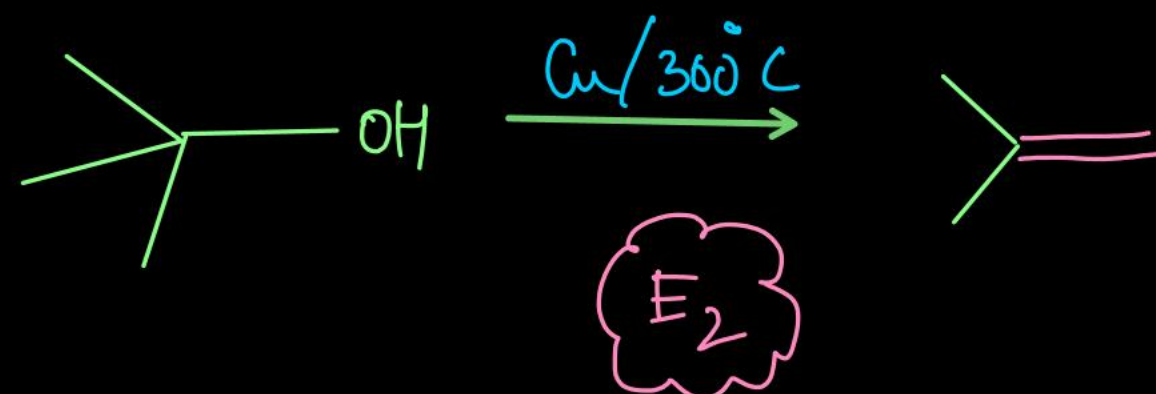


$1^\circ \text{ROH} \longrightarrow \text{aldehyde}$

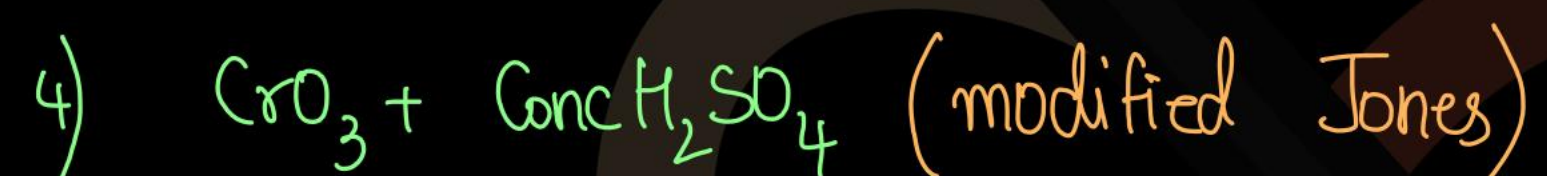
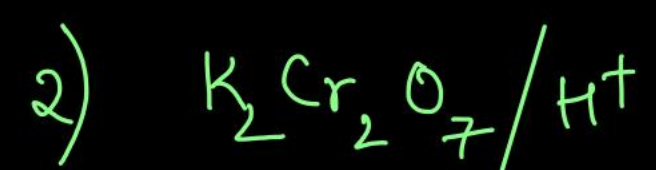
$2^\circ \text{ROH} \longrightarrow \text{ketone}$

$3^\circ \text{ROH} \longrightarrow \text{X}$

* v) $\text{Cu}/300^\circ\text{C}$



b) Strong (O.A)



$1^\circ \text{ROH} \longrightarrow \text{Acid}$

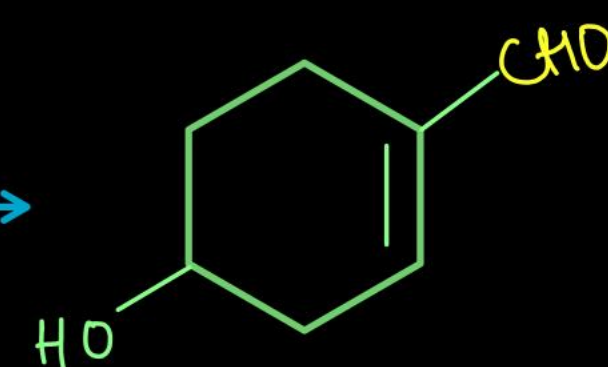
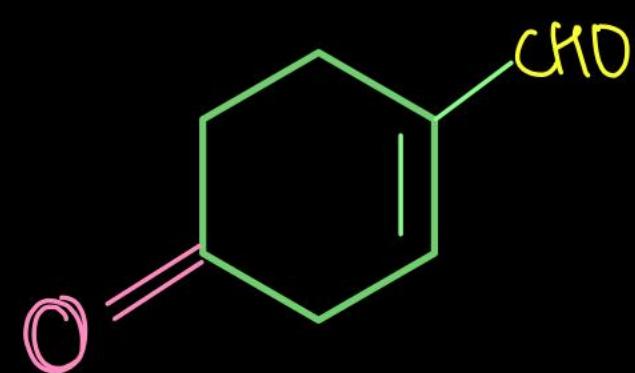
$2^\circ \text{ROH} \longrightarrow \text{Ketone}$

$3^\circ \text{ROH} \longrightarrow \text{No Rxn}$

Note:-

MnO₂ acts as M.O.A for Benzylic & Allylic alcohols

Ex:-



Physical properties :-

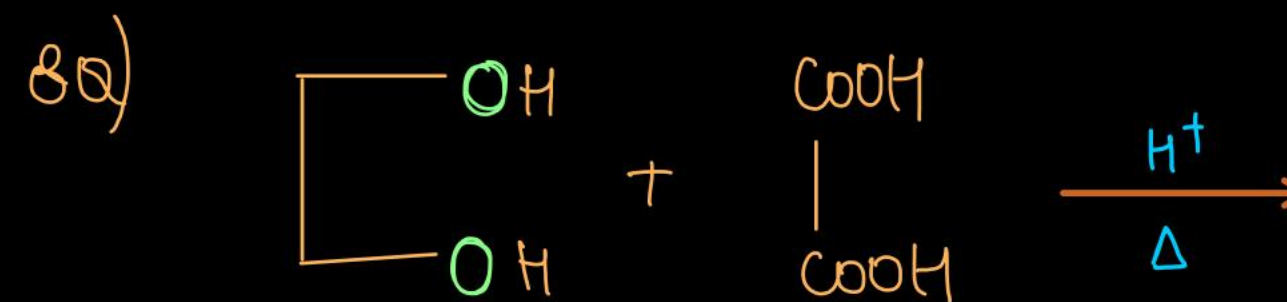
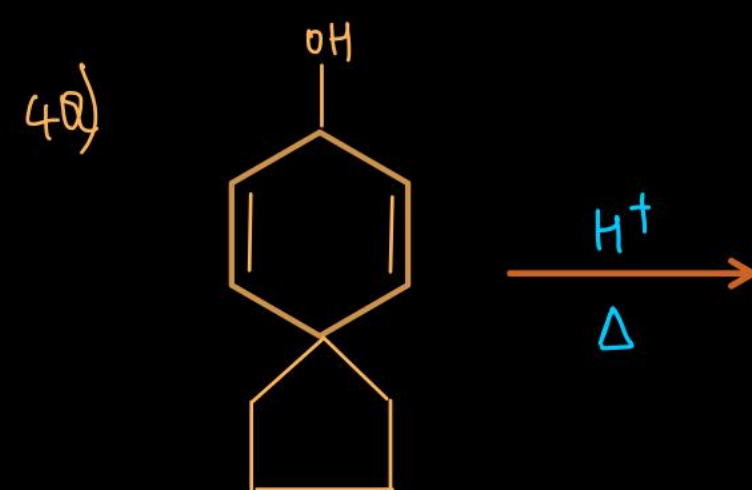
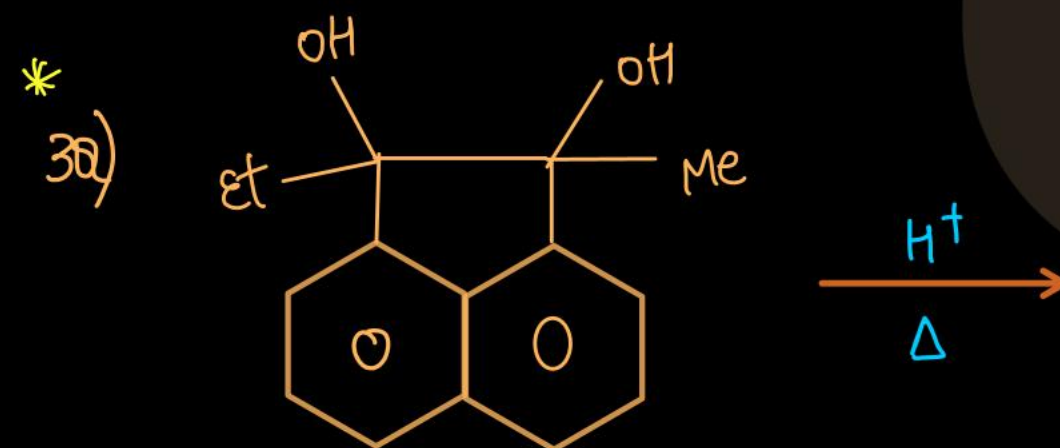
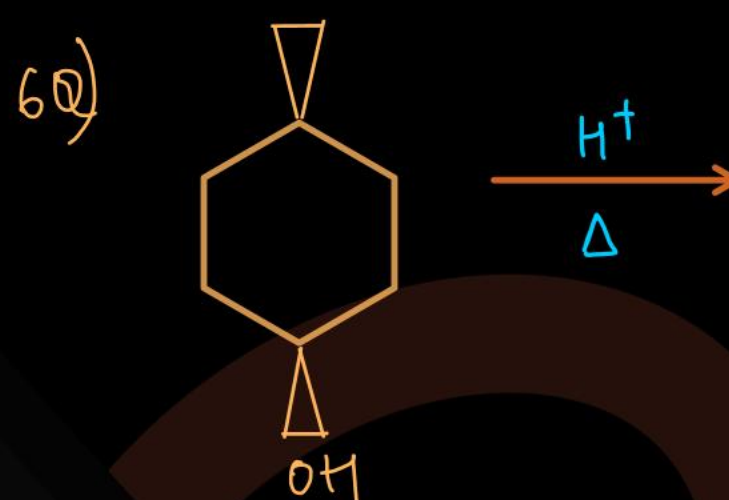
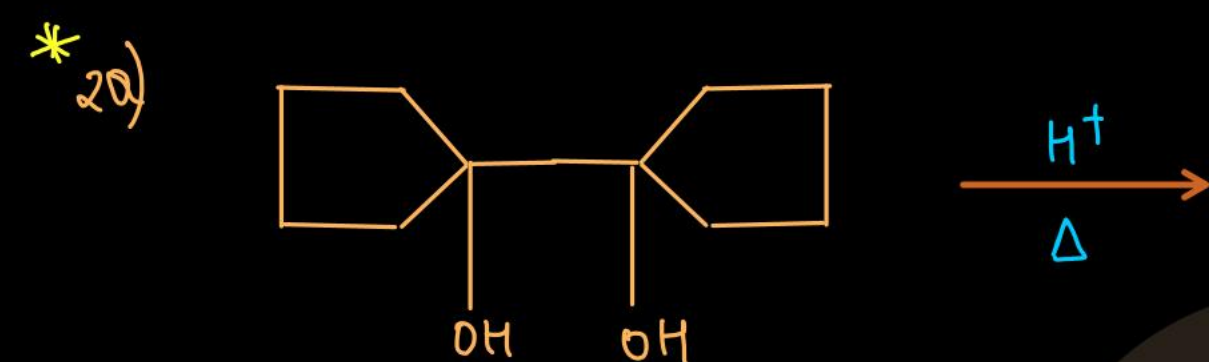
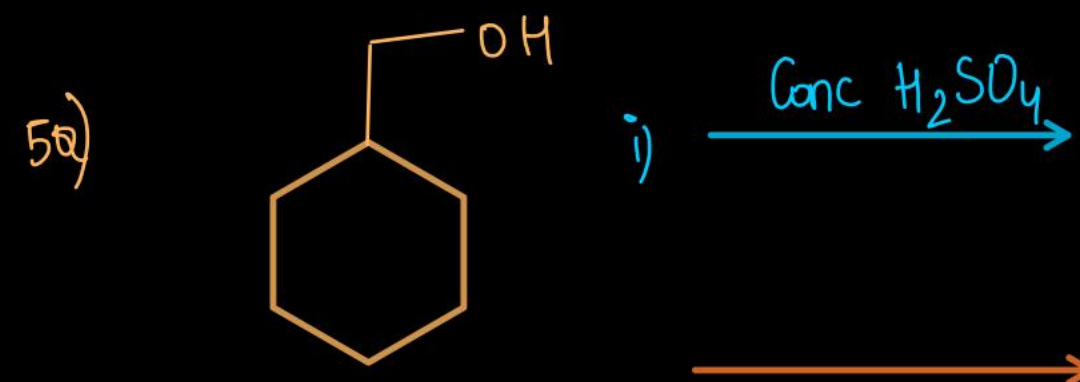
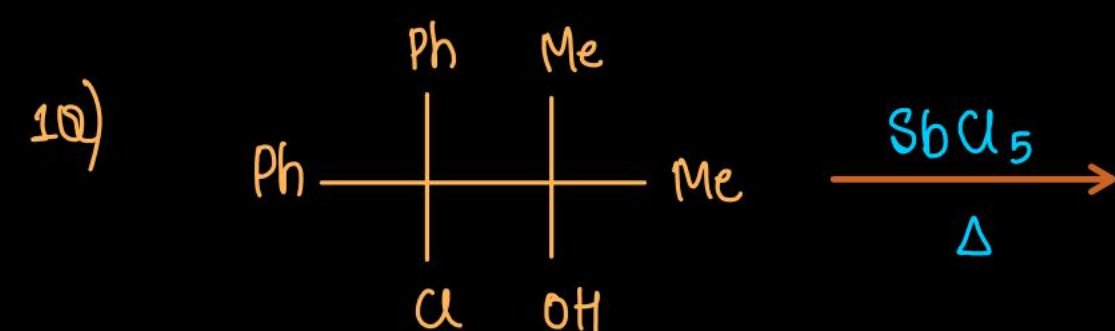
B.P : higher than Hydrocarbons, alkyl halides, ethers
of comparable masses

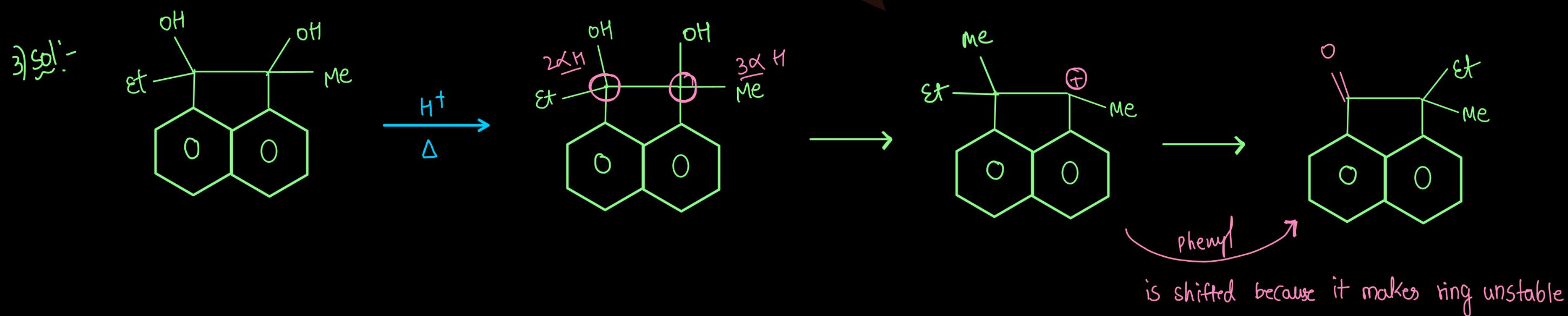
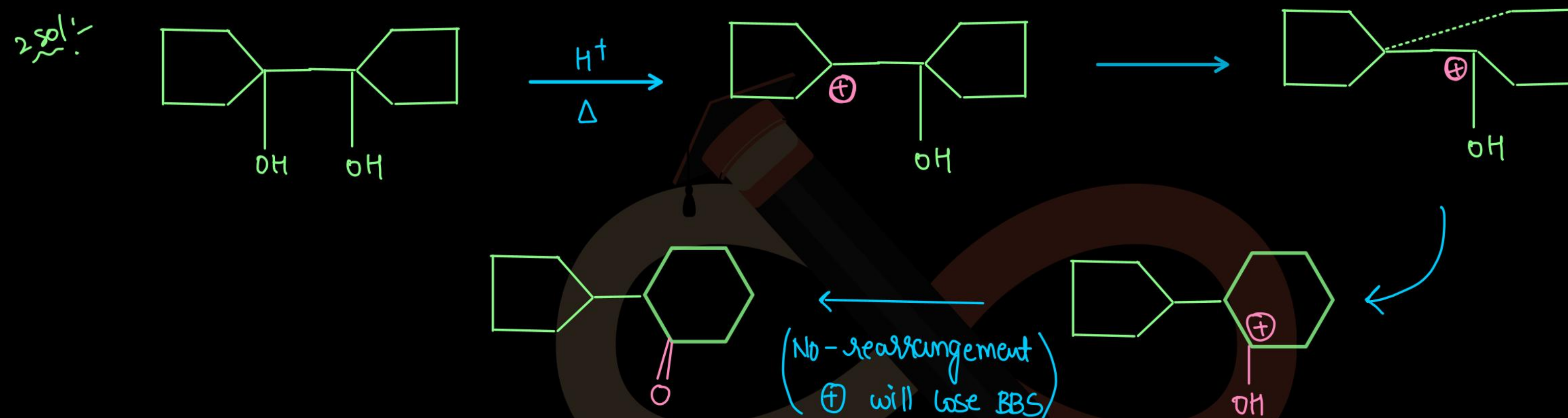
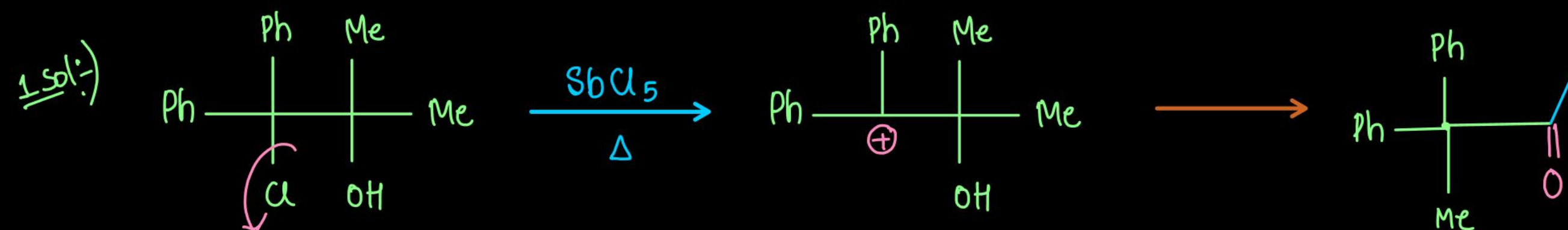
*) B.P $\propto$ no. of carbons

$\propto$ $\frac{1}{\text{branching}}$

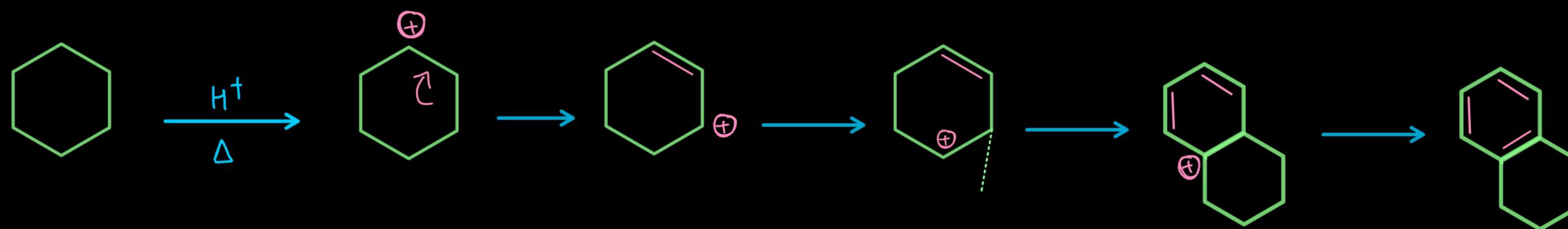
*) High B.P are due to Intermolecular H bond

Practice :

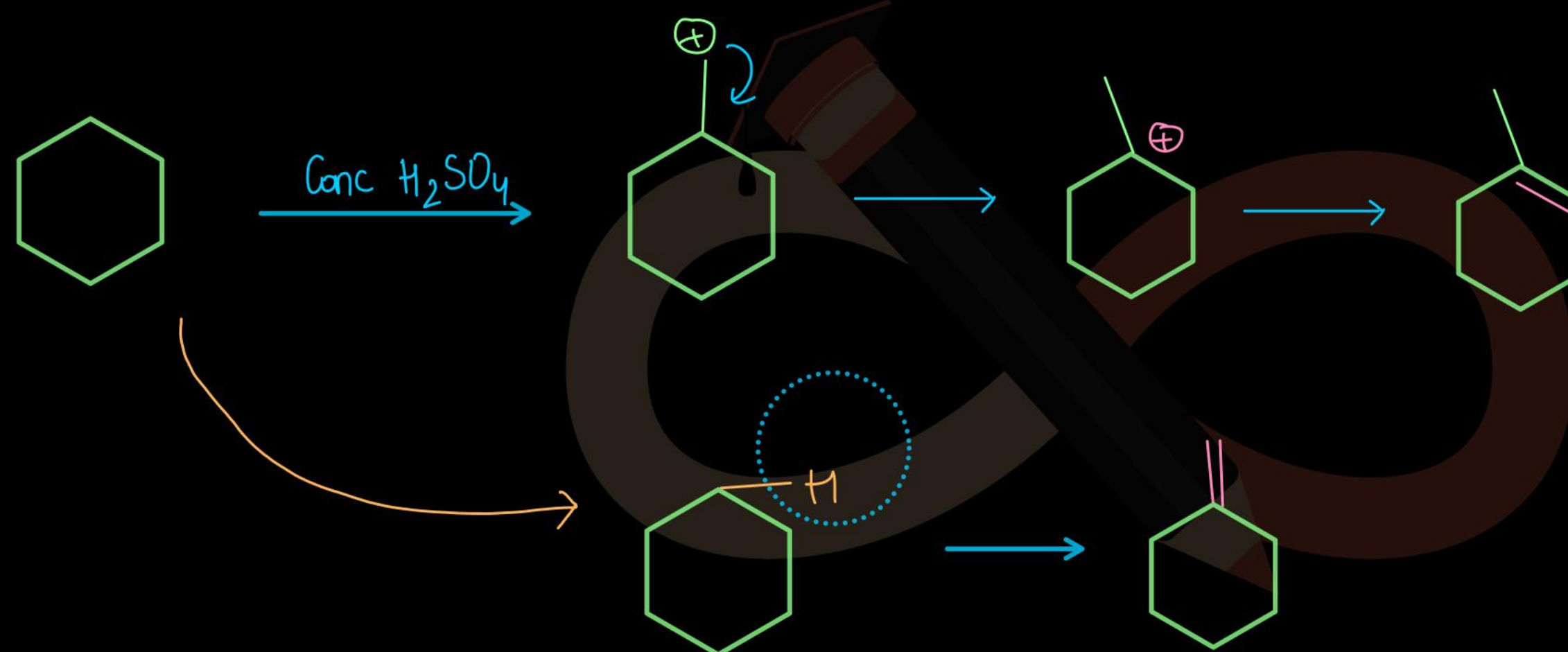




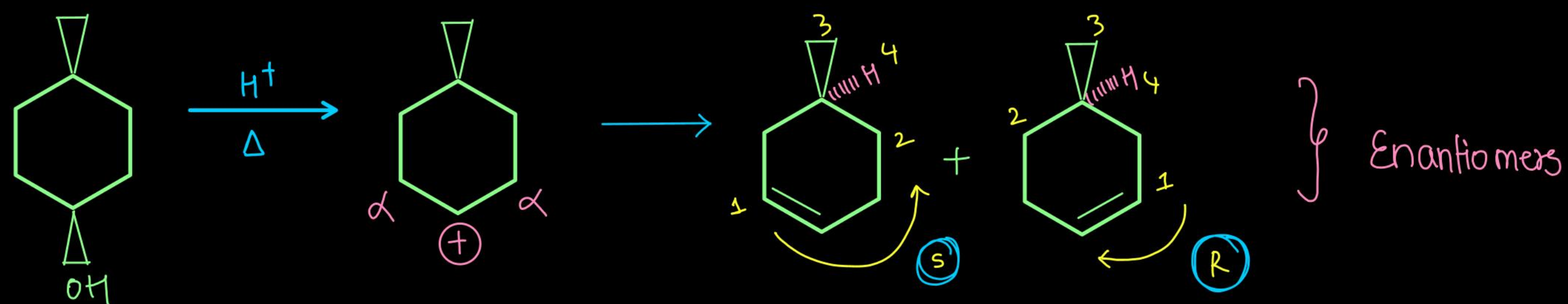
4) sol:-

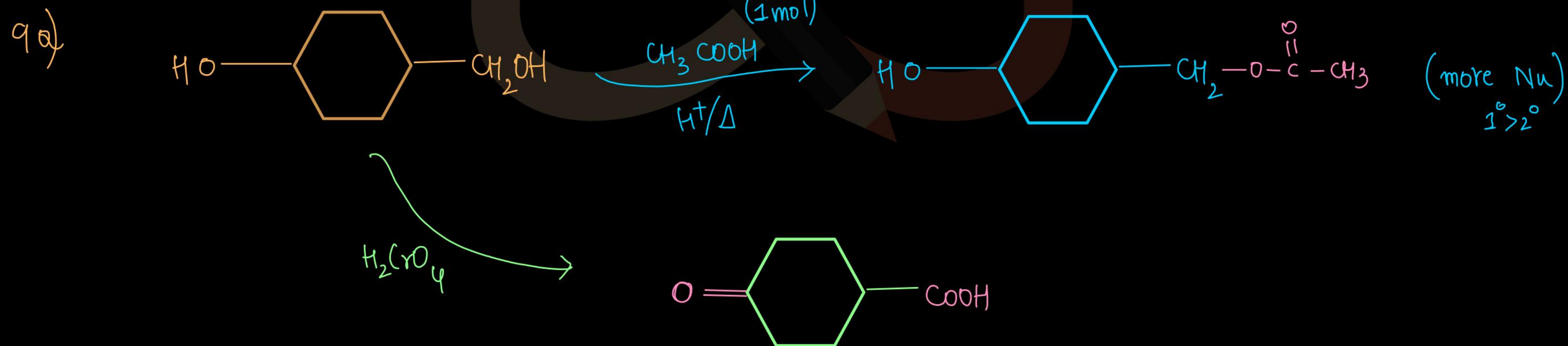
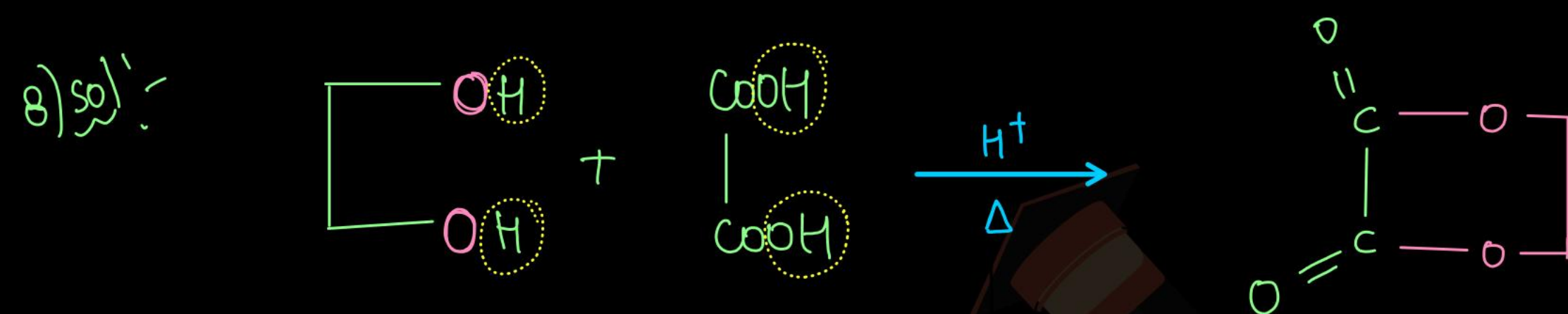
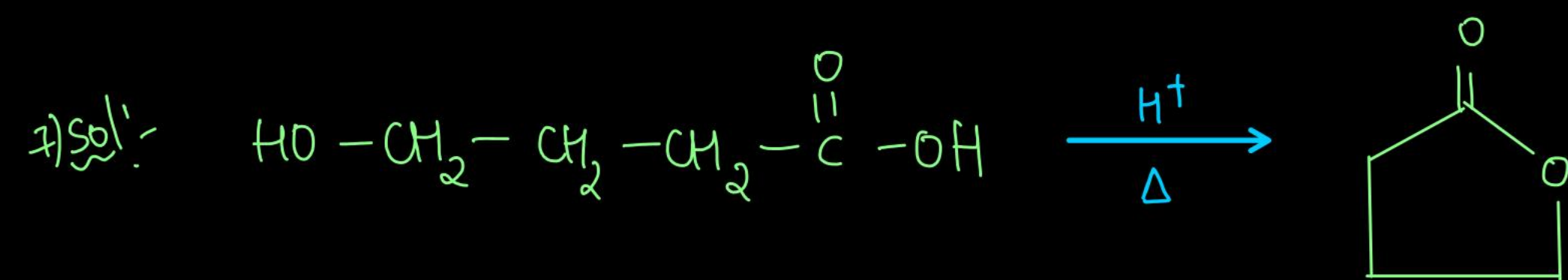


5) sol:-

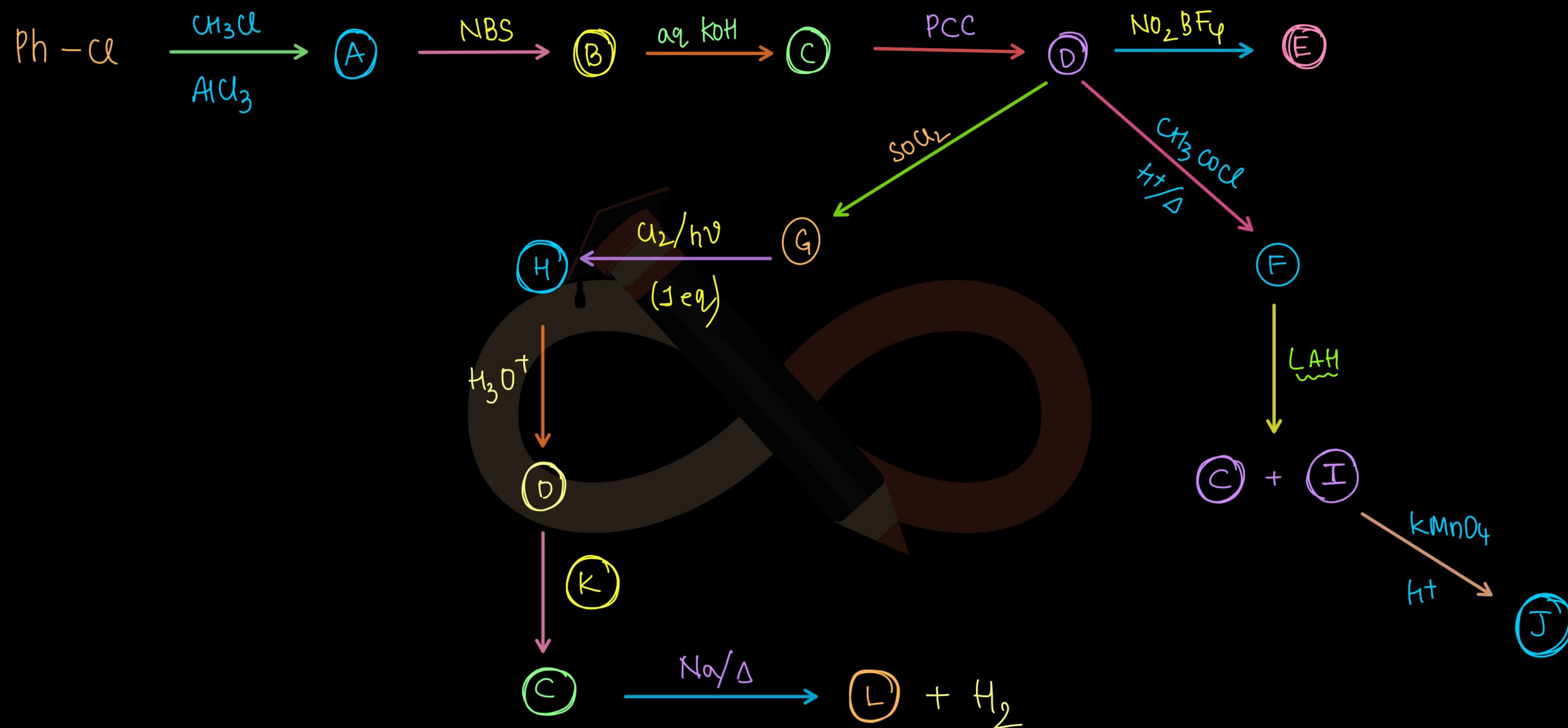


6) sol:-





Q



Sol:-

