

LAKSHYA

JEE 2025



Organic Chemistry

Lecture - 3

Alcohols, Phenols and Ethers

By – Rohit Agarwal (RA sir)



Topics

to be covered

- 1 Reduction
- 2 Oxidation of Aldehyde & Ketone





Nucleophilic

- (1) LAH
- (2) SBH

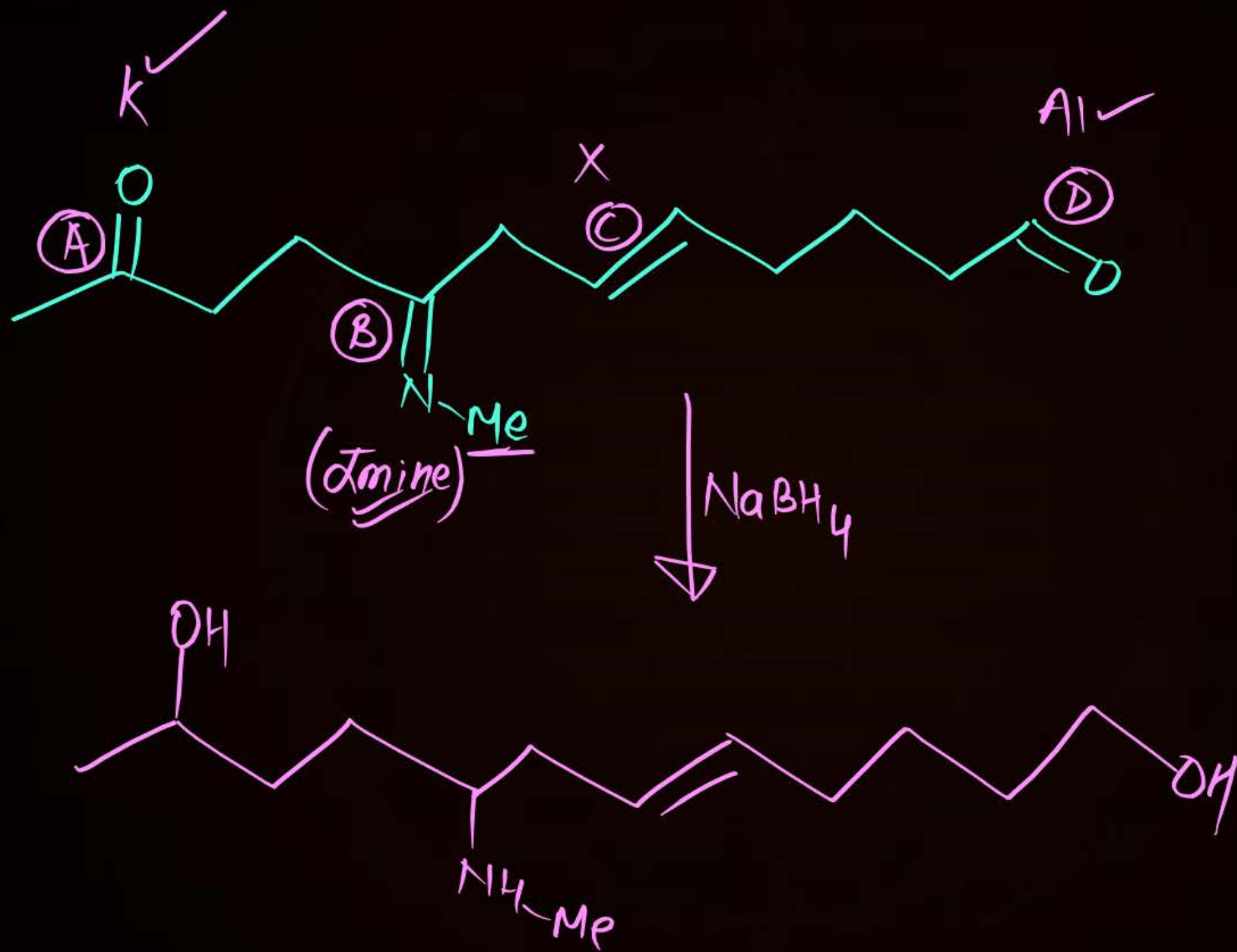
- $\delta + \checkmark$
- * acid halide
 - * Aldehyde
 - * ketone
 - * Imine

~~BA~~

Electrophilic

- (1) B_2H_6 (~~RCOU~~)
- (2) DIBAL ($\text{NPS} - \sim \sim \sim \text{O}$)

(Generally operate at -78°C)

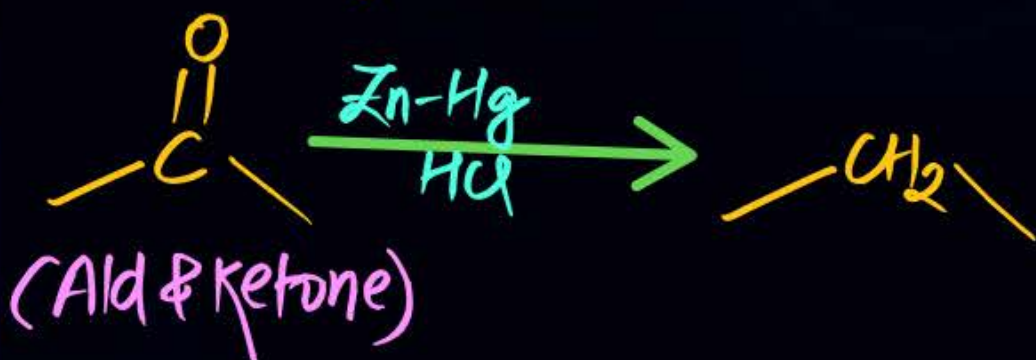


Clemmensen Reduction (C.R.)

① Reagent



② Function



③ Inter-mediate

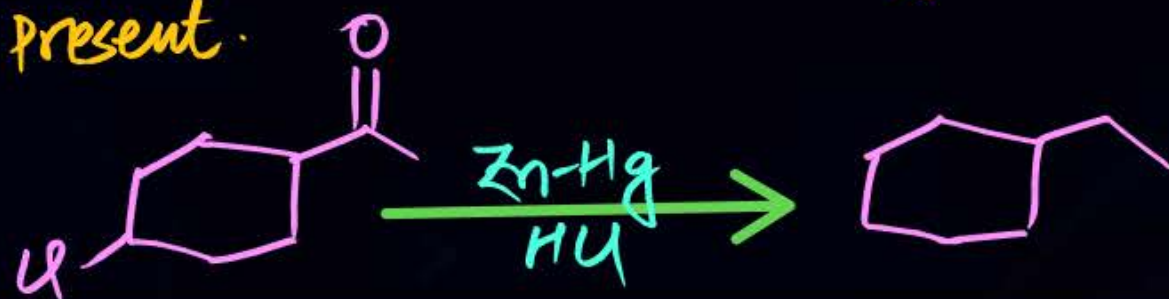
F.R. & Carbanion

④ Medium

Acidic Medium

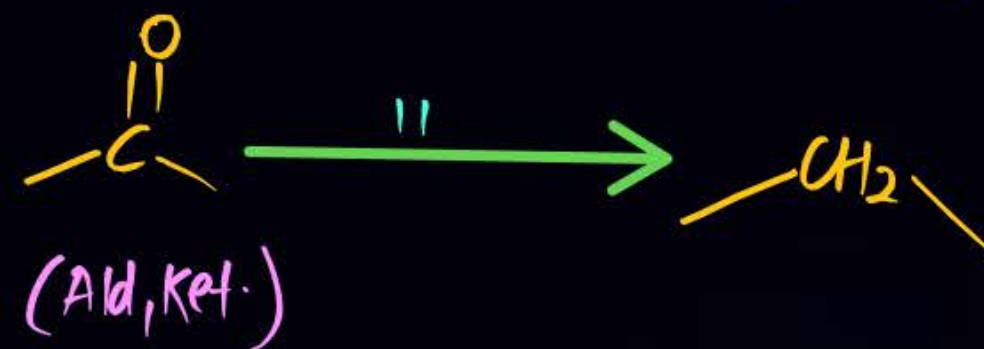
⑤ Caution
(सावधानी)

Acid sensitive or Zn reactive group must not present.



Wolff Kishner Reduction (W.K.R.)

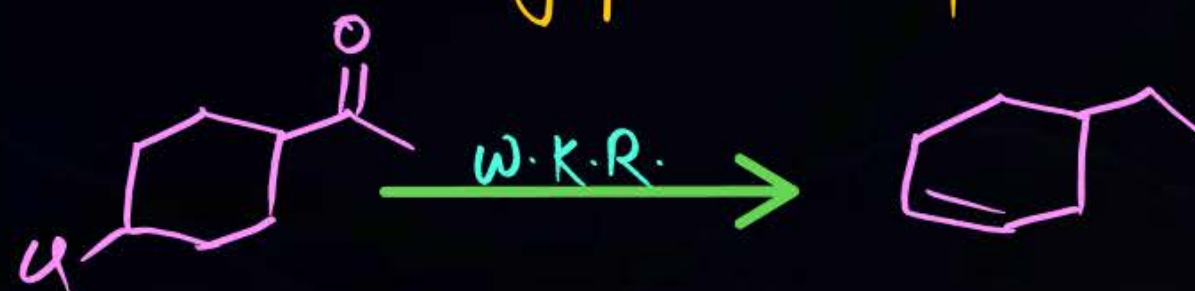
(1) N_2H_4 (2) NaOH/Δ , ethylene Glycol (solvent)



Carbanion

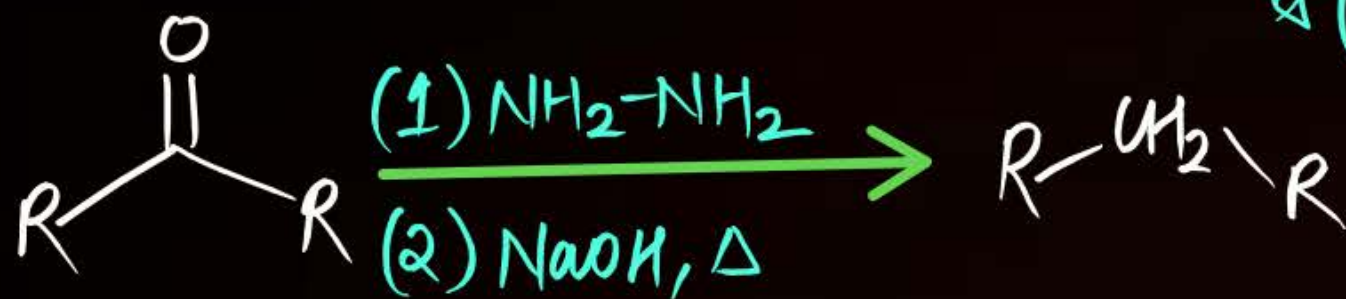
Basic Medium

Base Sensitive grp must not present



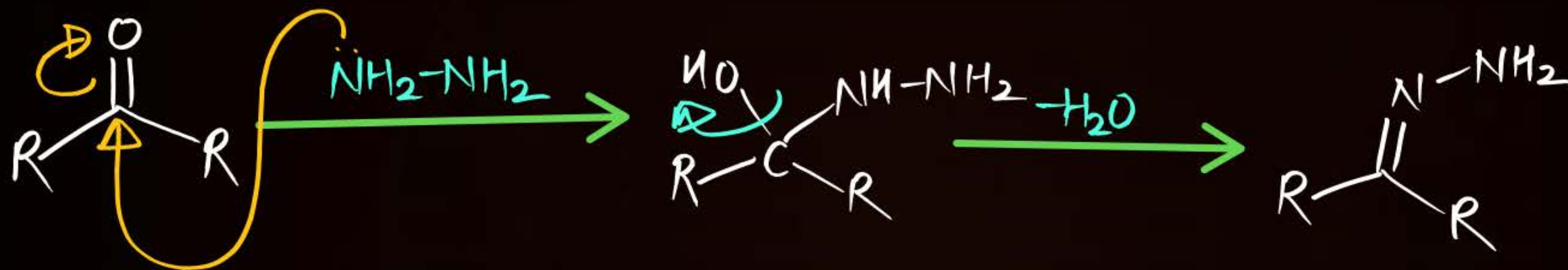
Wolff Kishner Reduction

Rxn:

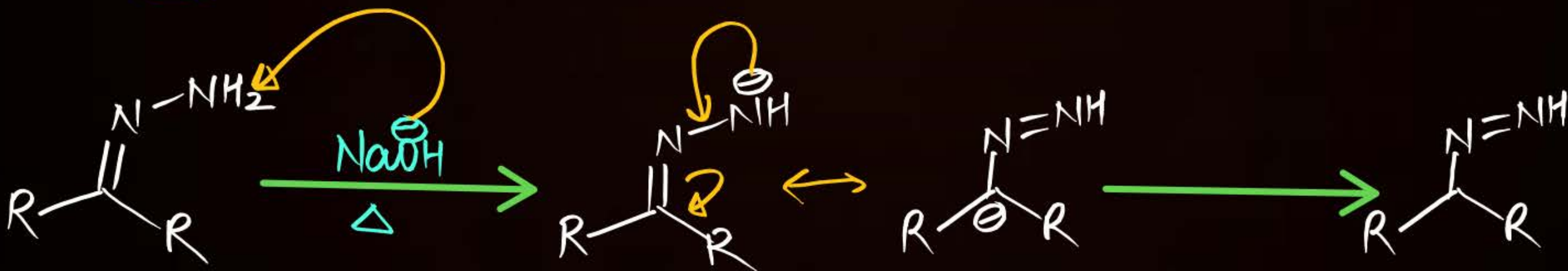


Mech^m:

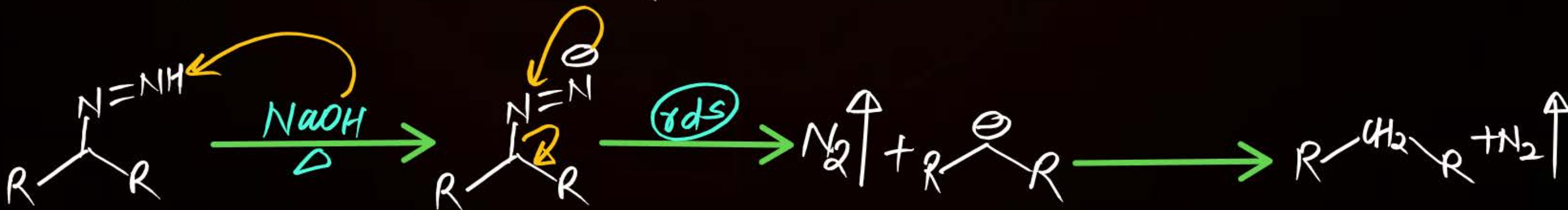
(1)

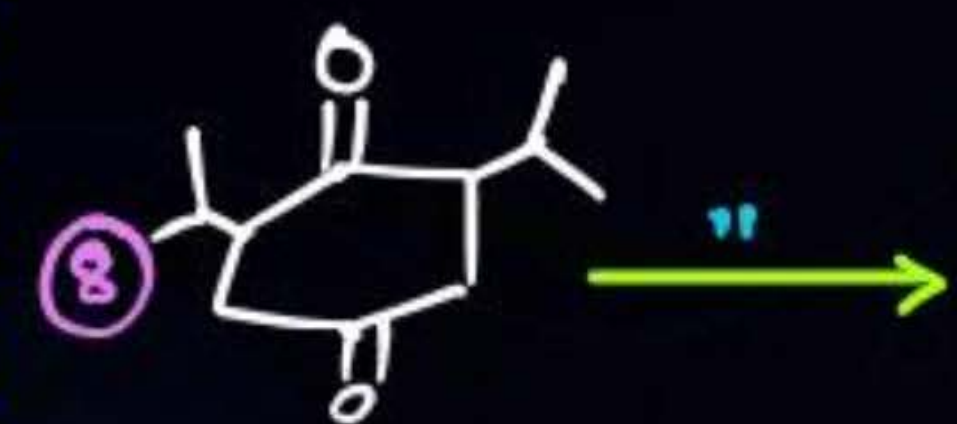
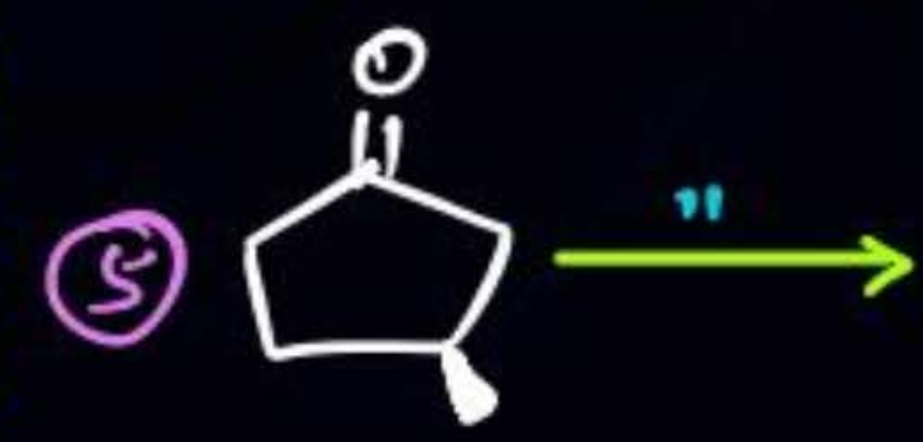
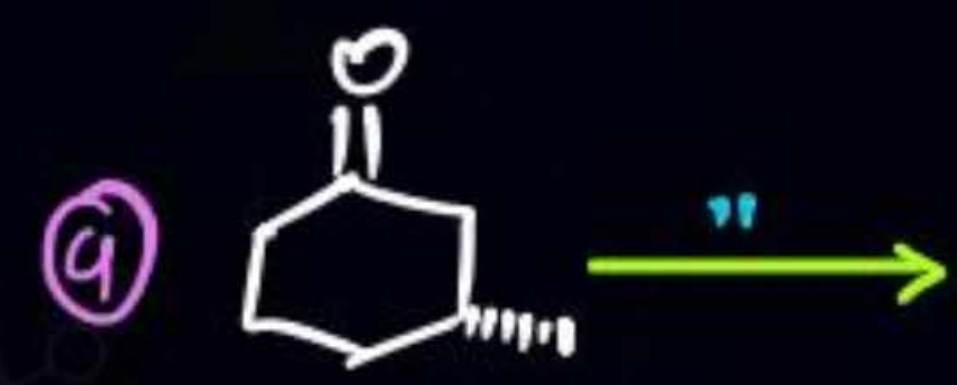
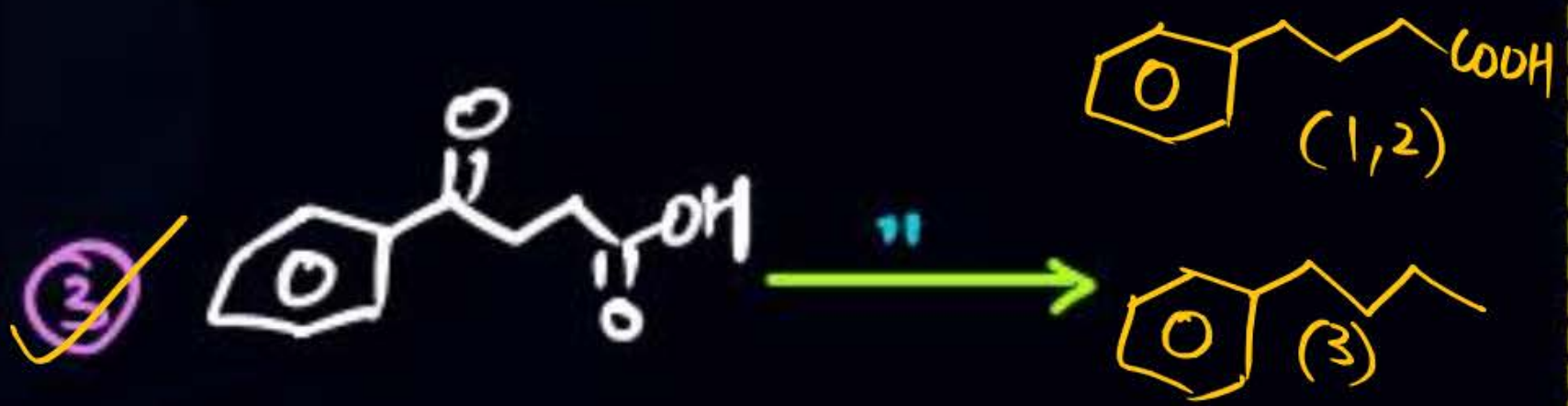
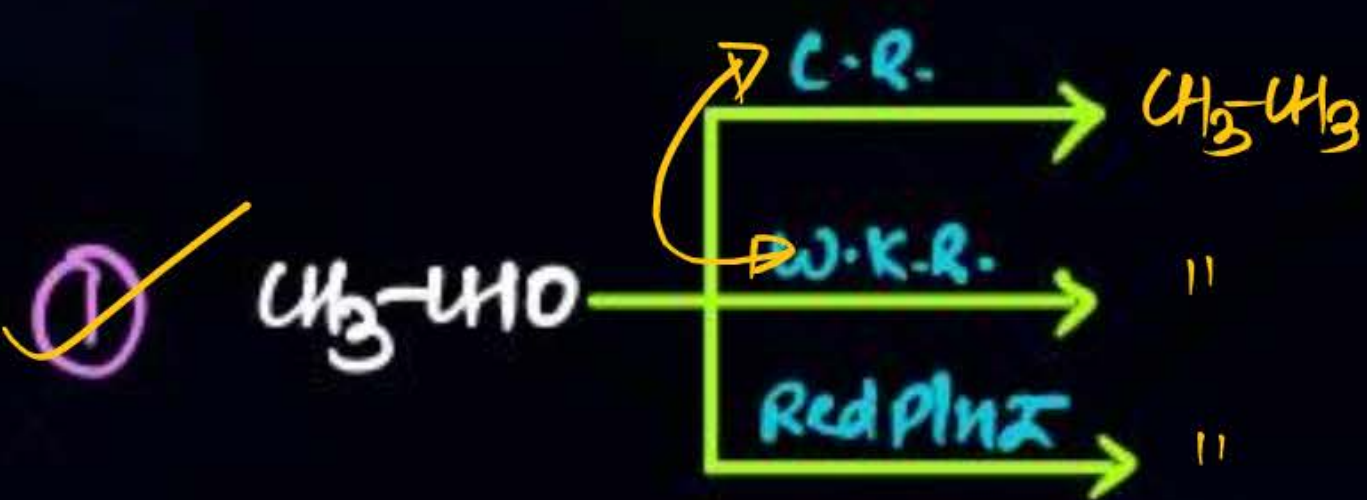


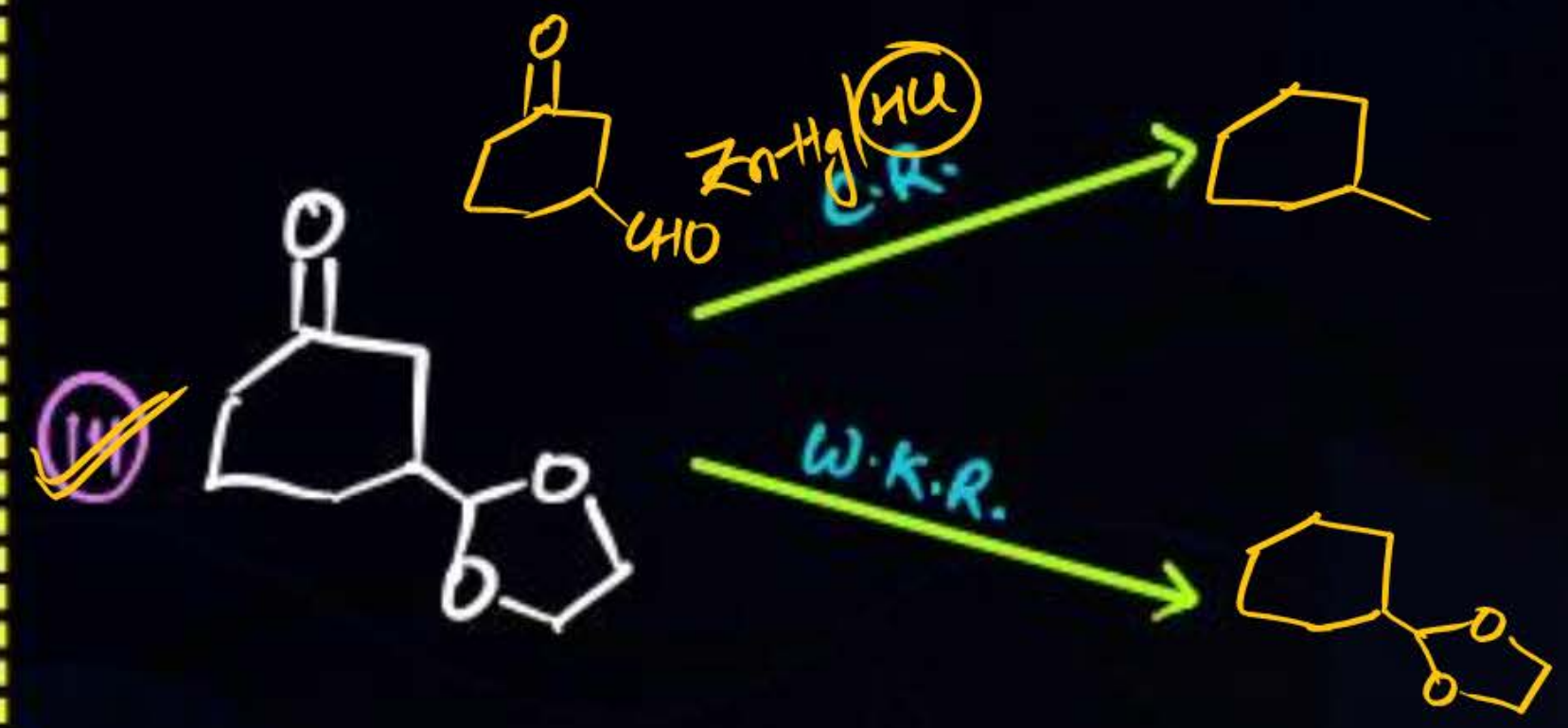
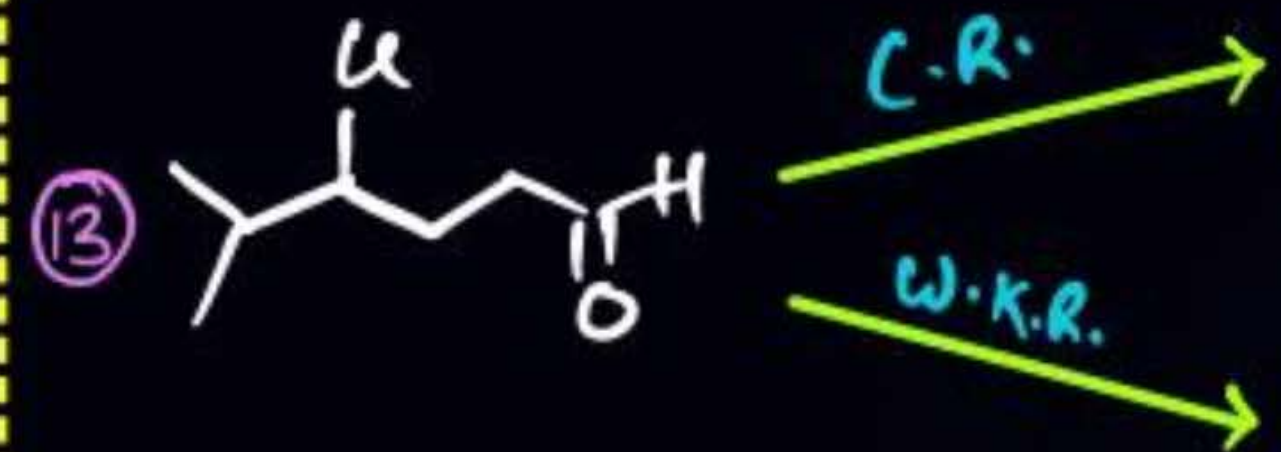
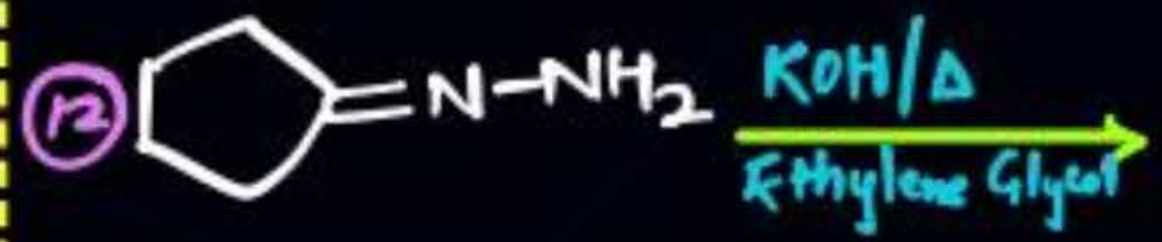
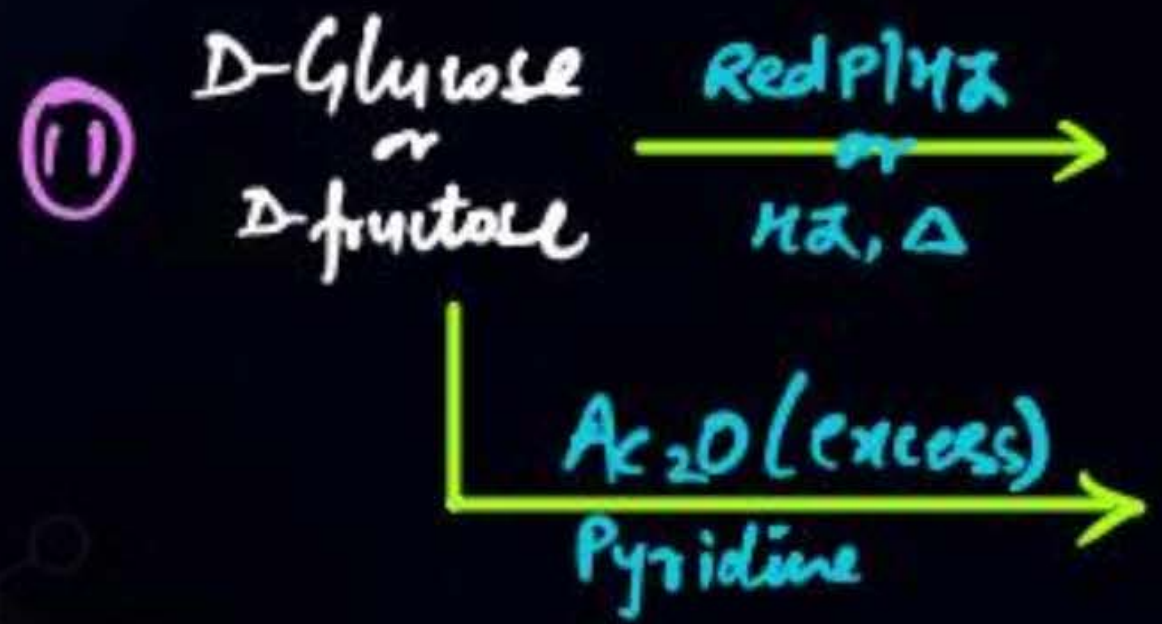
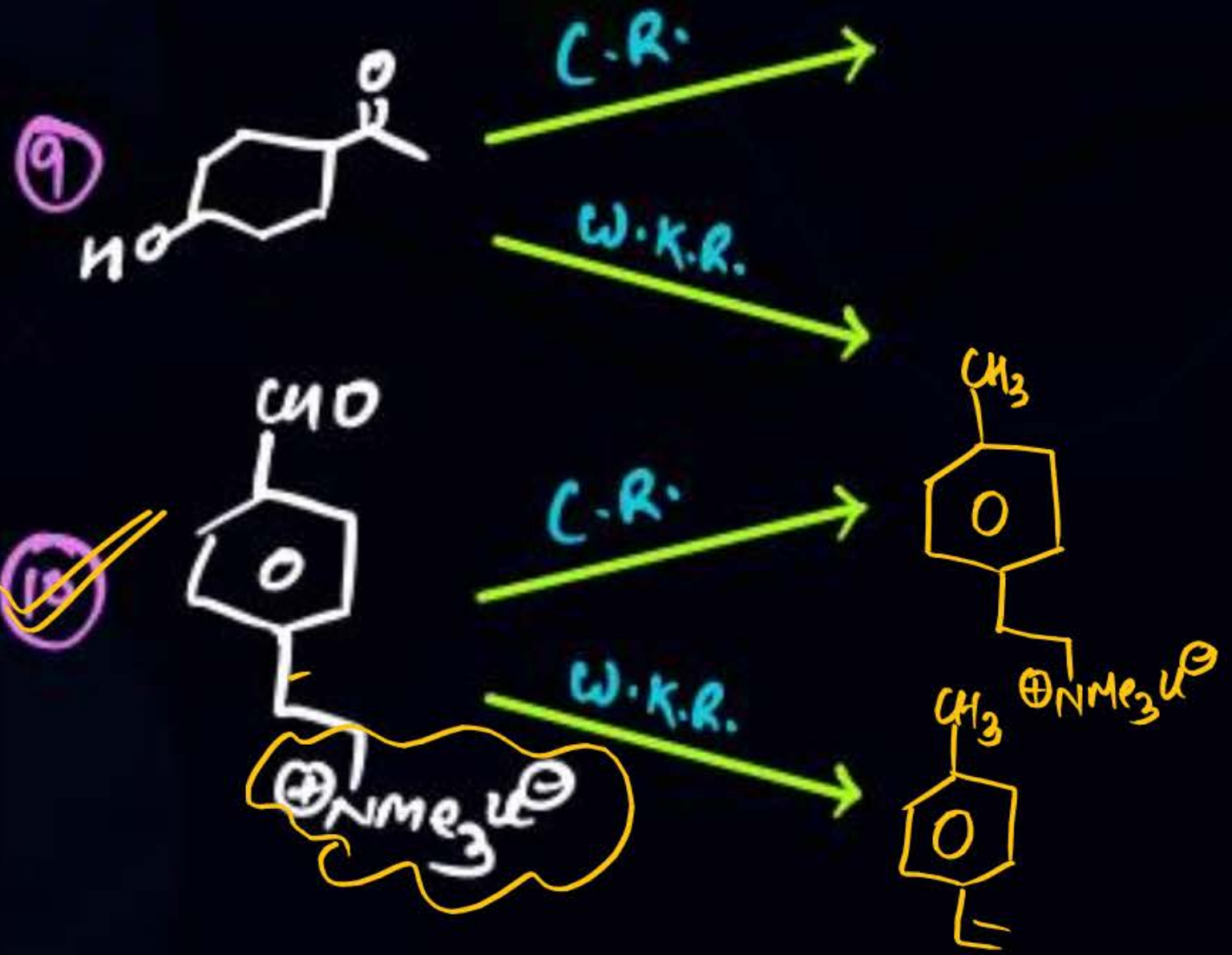
(2)

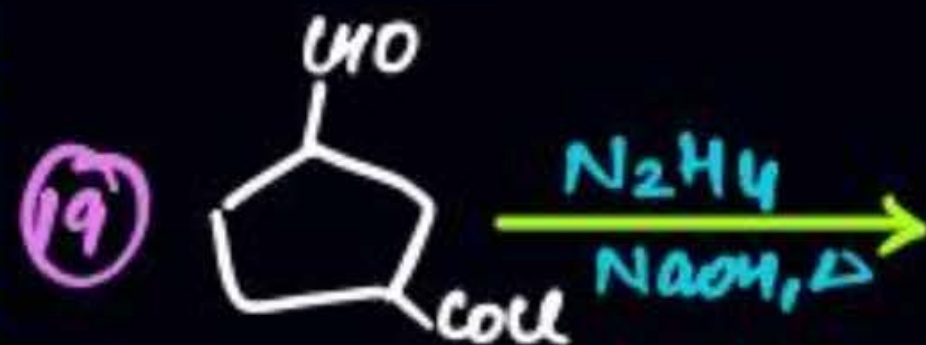
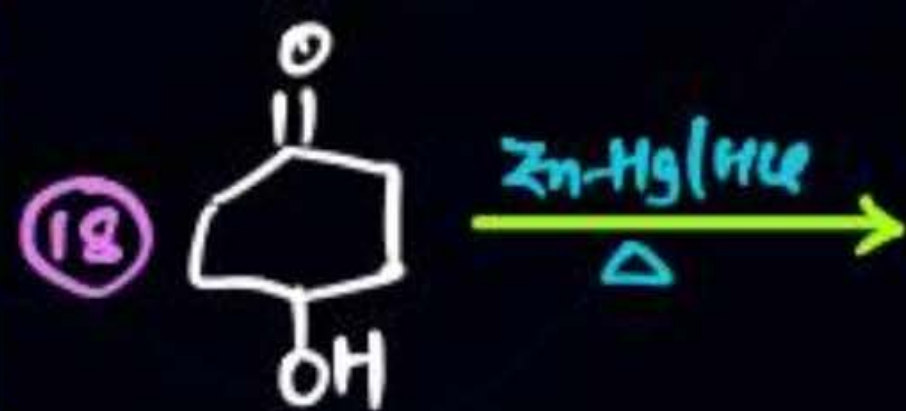
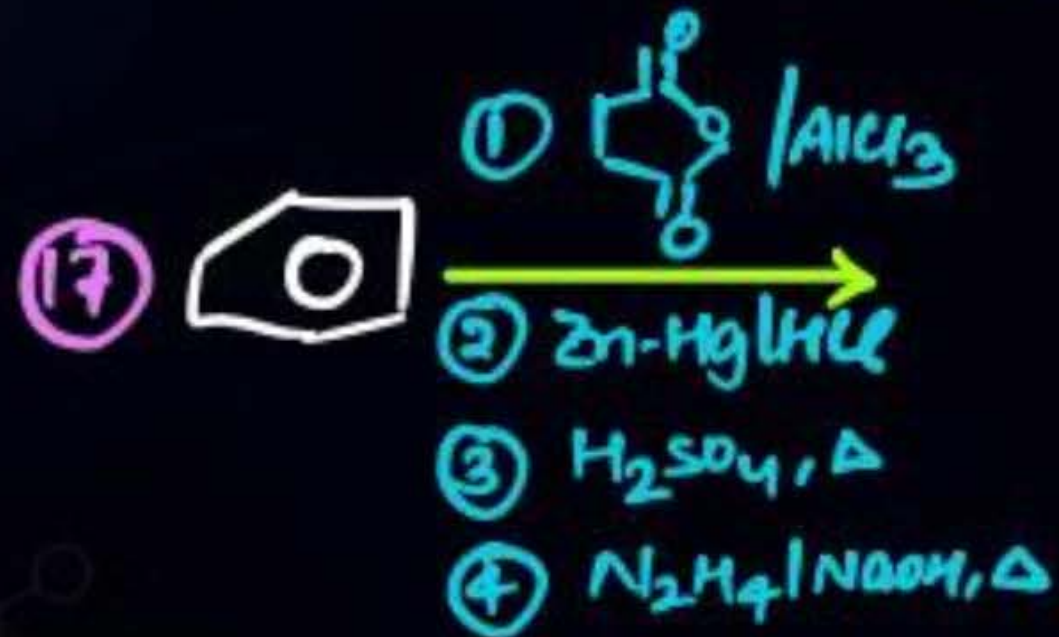
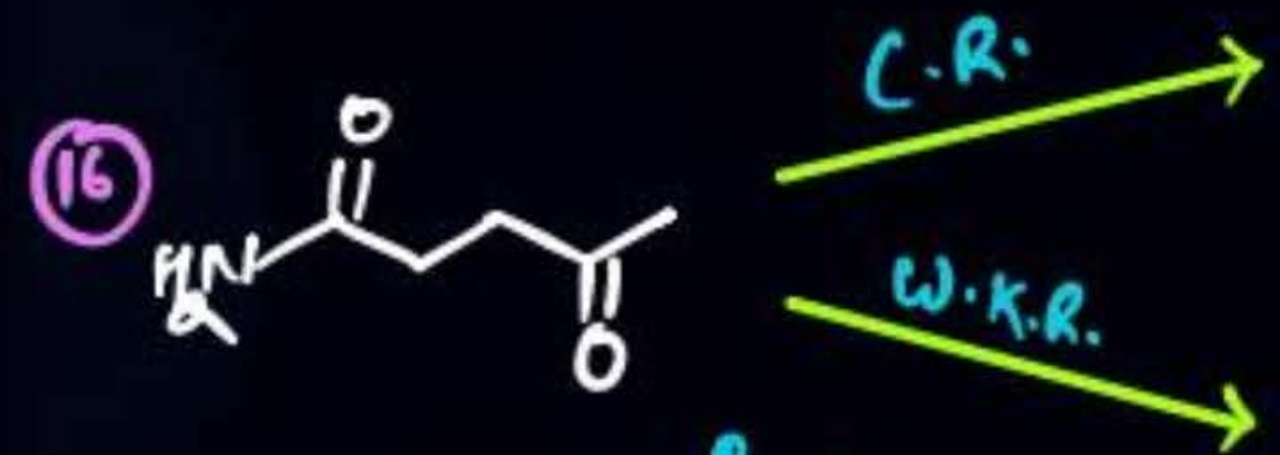
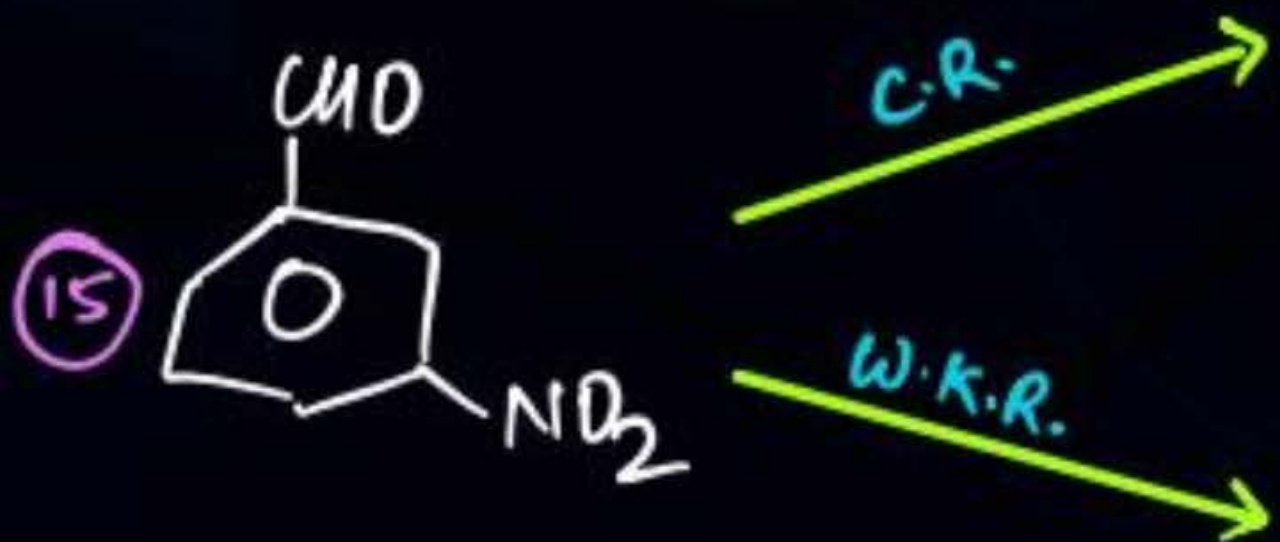


(3)









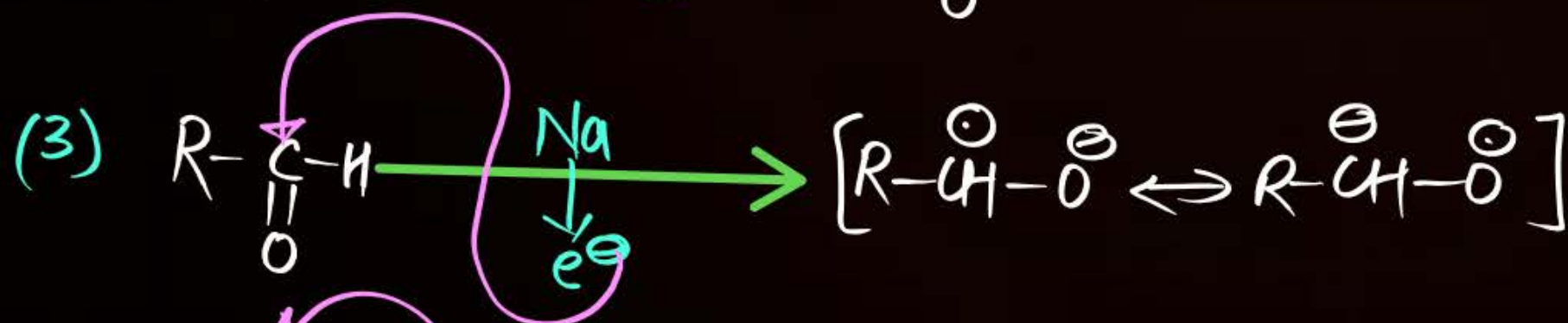
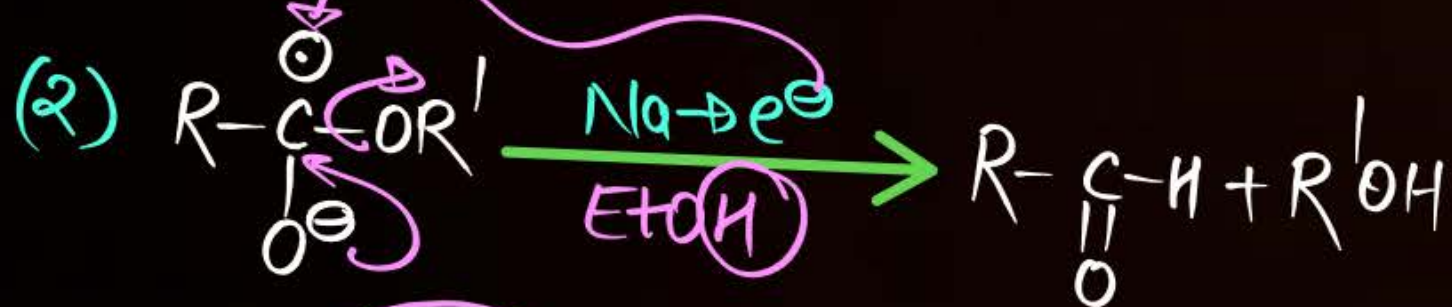
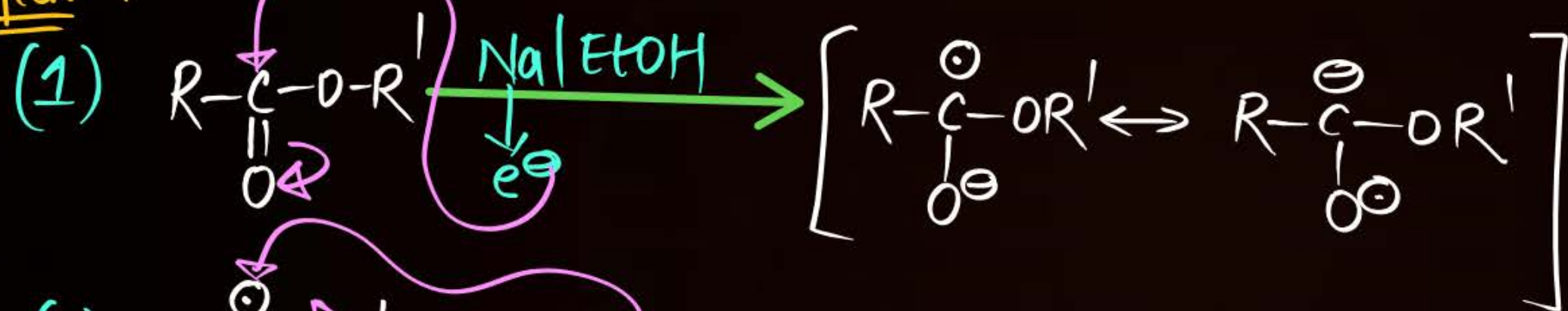
20 Total optically active carbonyl compound of mass 100gm which on reaction with Zn-Hg/HCl produces optically inactive compounds are:

* Bouveault Blanc Reduction

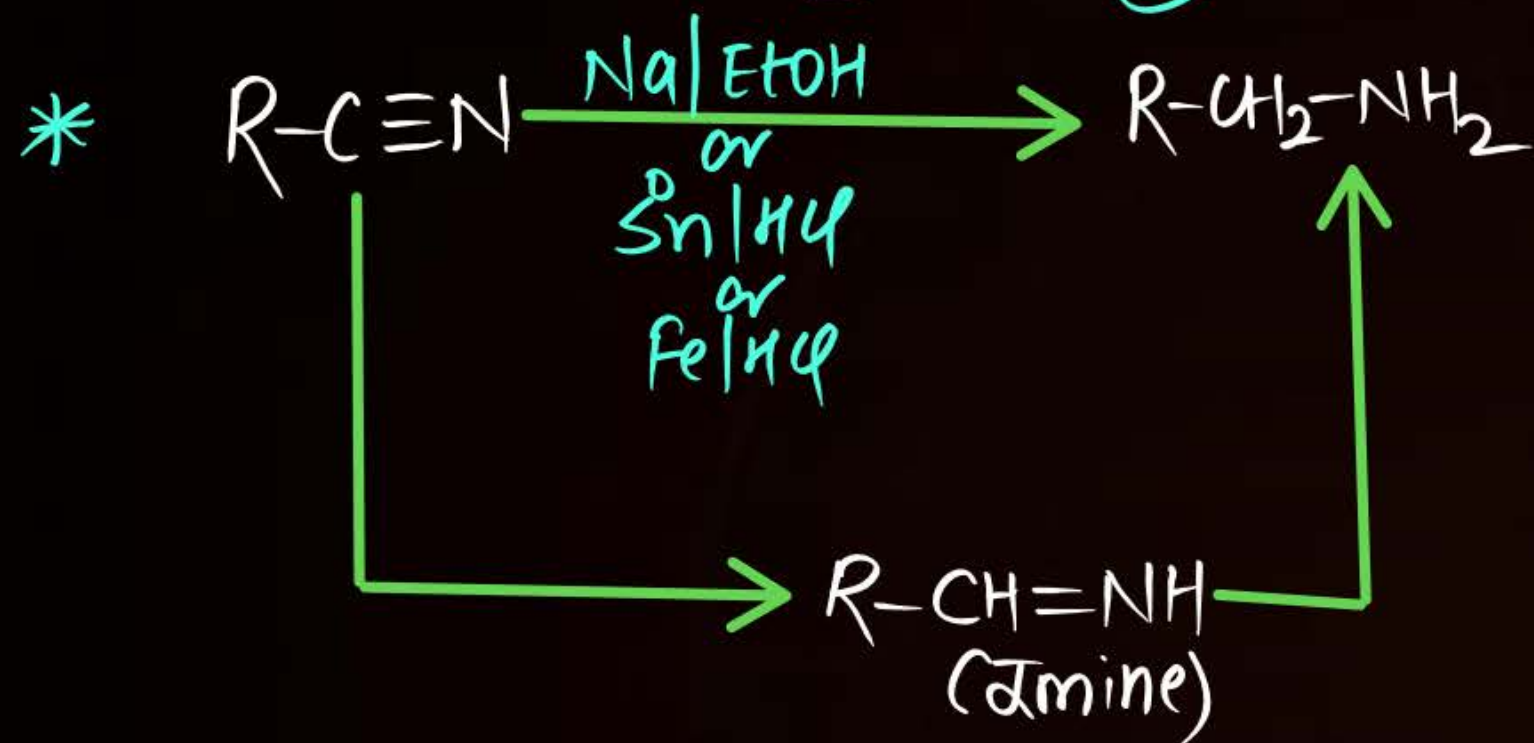


* Best Method to reduce Ester

Mech^m:

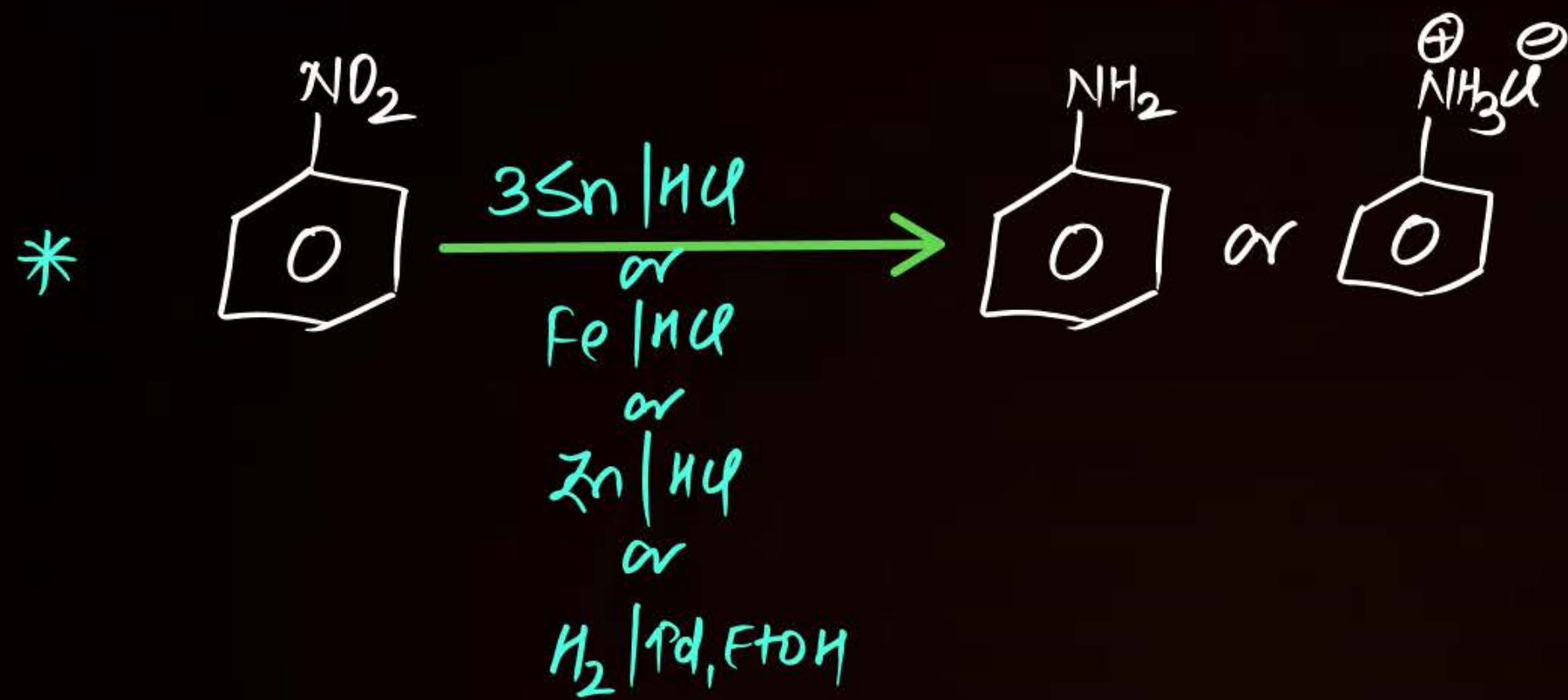


* Mendius Reaction



* Stephens Reduction





①

① $\text{HNO}_3/\text{H}_2\text{SO}_4$ ② Sn/HCl ③ $\text{NaNO}_2/\text{HCl}, 273\text{K}$ ④ CuCN/KCN ⑤ SnCl_2/HCl ⑥ H_2O

①

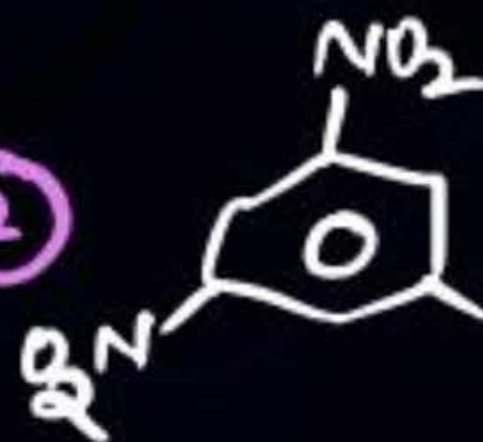
① H_2O

② Red hot Fe tube

③ $\text{KMnO}_4/\text{KOH}, \Delta$ ④ H^+ ⑤ $\text{SOCl}_2 (\text{xs})$ ⑥ $\text{H}_2/\text{Pd}, \text{BaSO}_4$ ⑦ Red P/H₂③ Mg_2C_3

①

②

① Sn/HCl ② $\text{NaNO}_2/\text{HCl}, 273\text{K}$ ③ $\text{CuCN/KCN} (\text{xs})$ ④ SnCl_2/HCl ⑤ H_2O ⑥ Zn-Hg/HCl ①
②
③
④
⑤
⑥

④

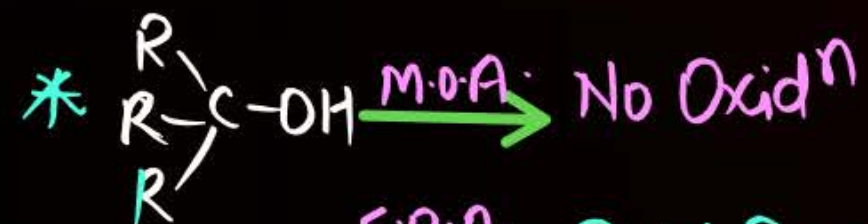
① Br_2/NaOH ② $\text{HNO}_2, 273\text{K}$ ③ CuCN/KCN ④ Na/EtOH ① LiAlH_4 ② NaNO_2/HCl ③ HCl/ZnCl_2 ④ $\text{Na}_2\text{S}/\text{acetone}$ ⑤ AgCN

①

①
②
③
④
⑤

Oxidation

Alcohol



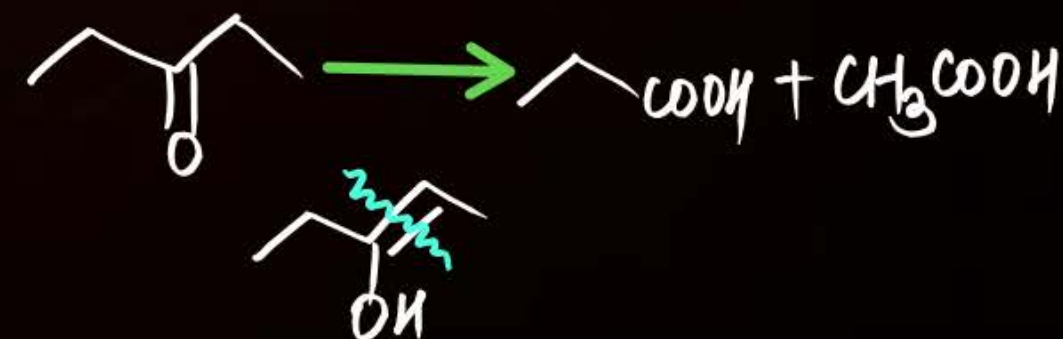
Aldehyde



Ketone

* No Oxidⁿ at R-T.

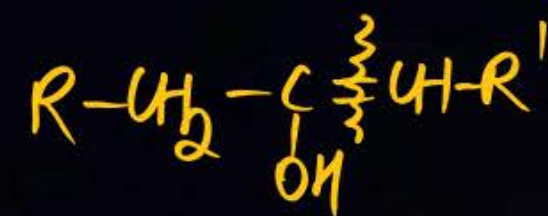
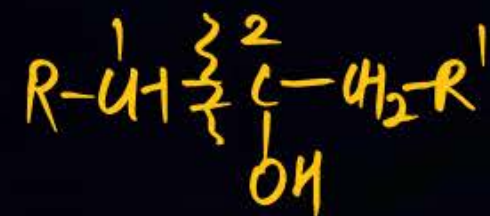
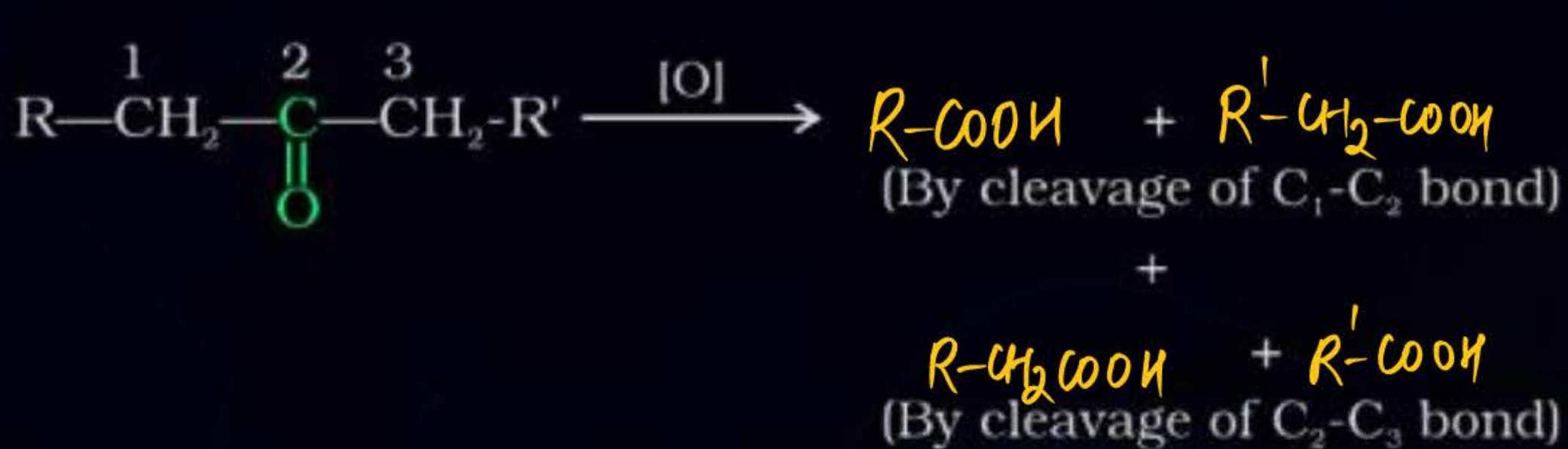
Tauto \rightarrow Oxidative Ozonolysis

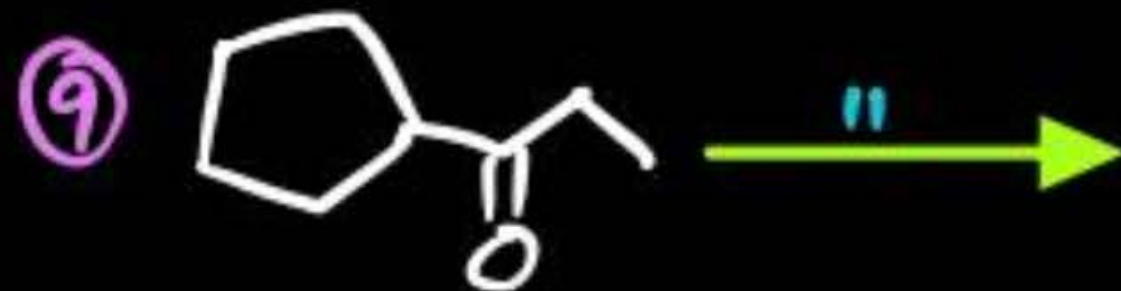
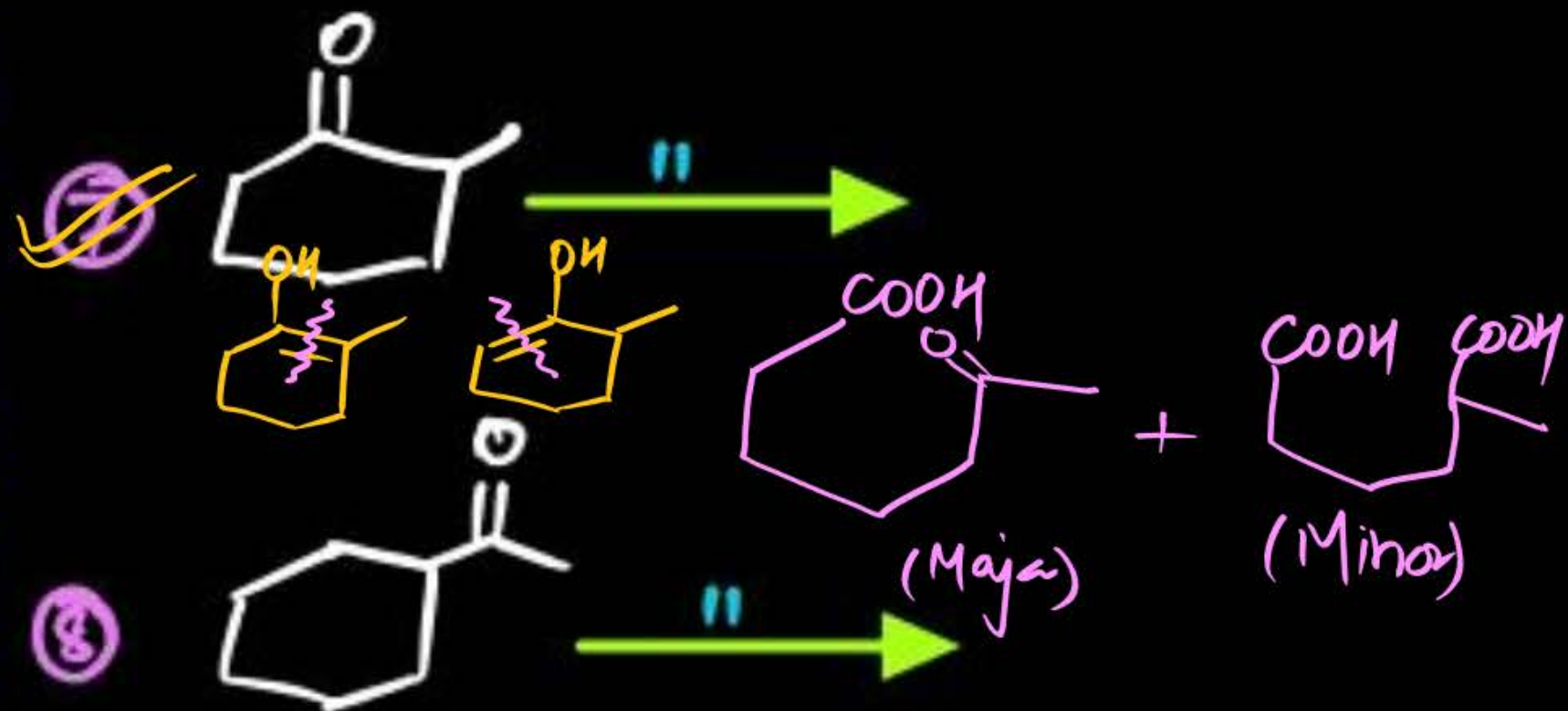
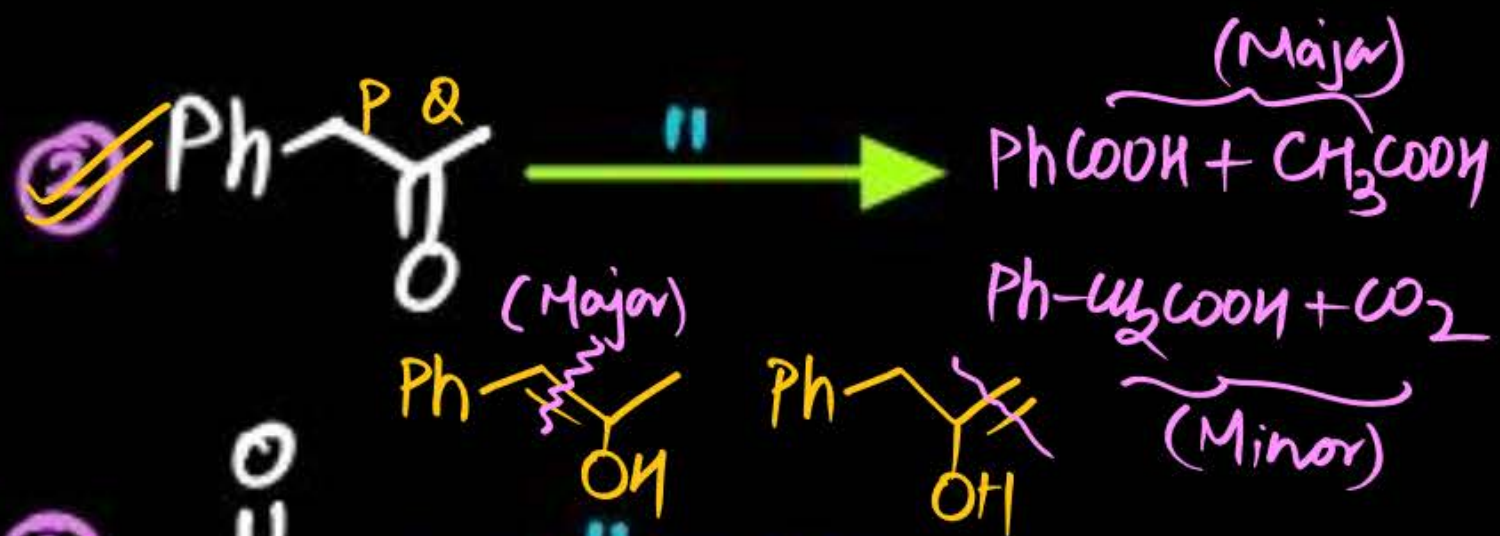


Popoff's Rule

Ketones are generally oxidised under vigorous conditions, i.e., strong oxidising agents and at elevated temperatures. Their oxidation involves carbon-carbon bond cleavage to afford a mixture of carboxylic acids having lesser number of carbon atoms than the parent ketone.

(Tauto \rightarrow Oxidative Ozonolysis)





* Oxidation of Aldehyde

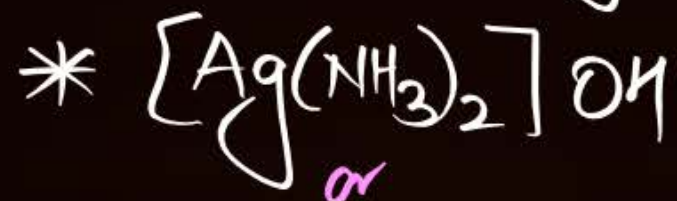


(1) Tollen's Reagent:

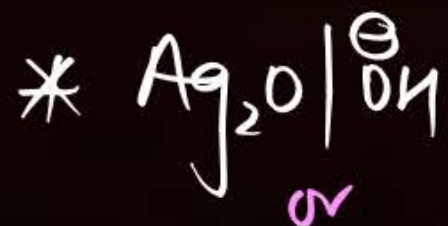


* Basic Medium

* Ammoniacal AgNO_3



* Tollen's Reagent



* Silver mirror test

Reactions with:



Reaction

Silver Mirror

Silver Mirror

Silver Mirror

Silver Mirror

White ppt

$-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{H}$ present (All aldehyde & $\text{H}-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{OH}$)

(-COOH)

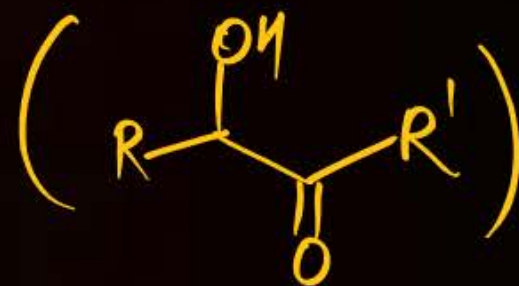
$-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{H}$

forms

(-COOH)



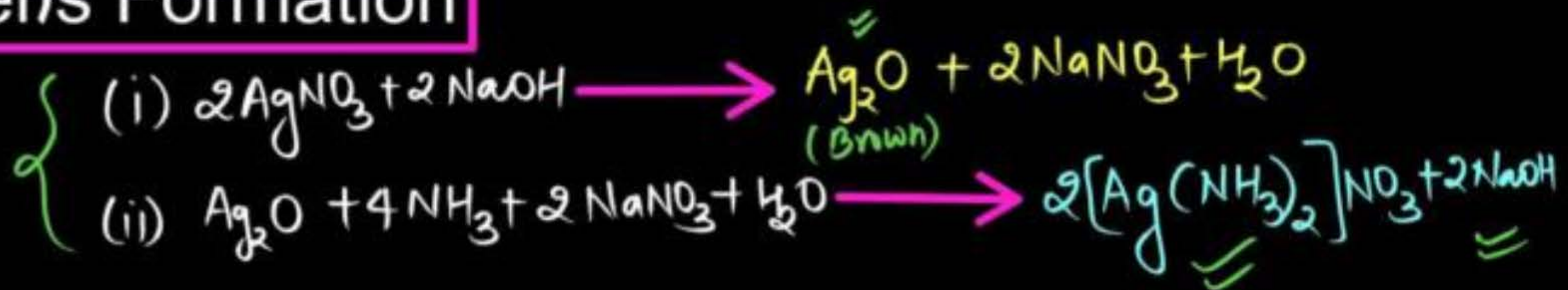
α -hydroxy Carbonyl
(Ald/Ketone)



Tartaric acid, Ph-NH-OH (Mullikan Barker test)
(Tartonic acid) (Ph-N=O)

Terminal Alkyne $\left(\text{R}-\text{C}\equiv\text{CH} \longrightarrow \text{R}-\text{C}\equiv\text{C}^{\oplus}\text{Ag}^{\ominus} \right)$

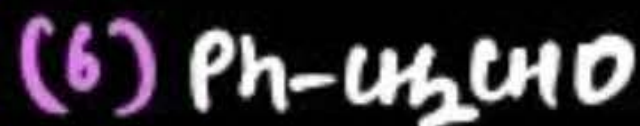
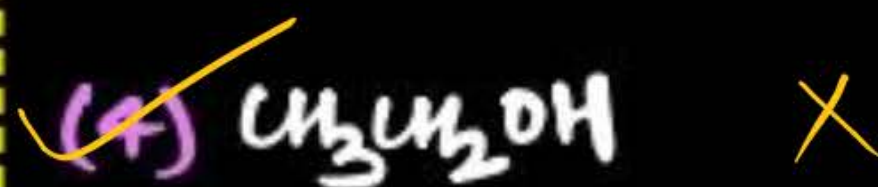
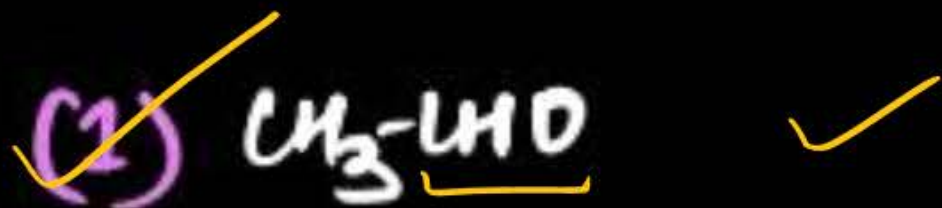
* Tollen's Formation

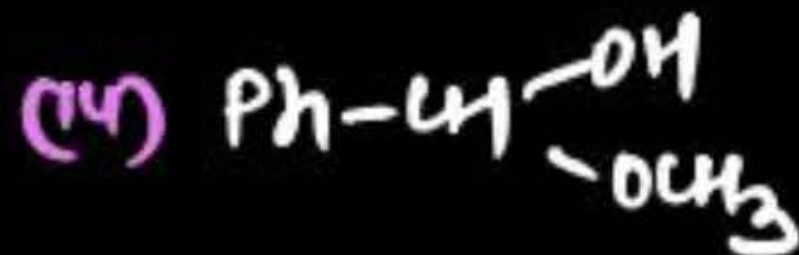
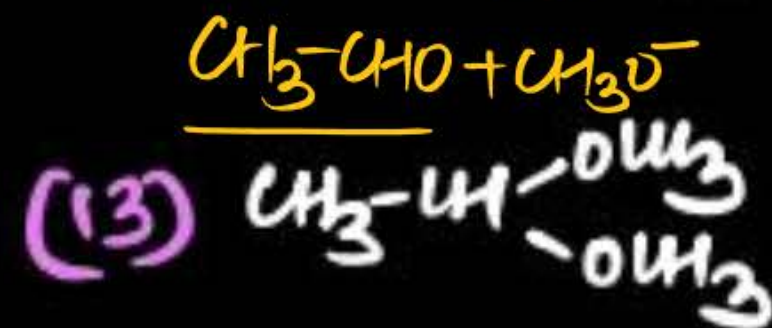
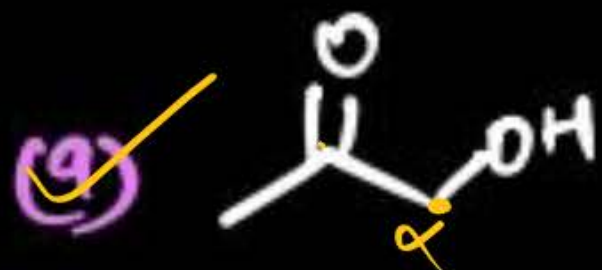


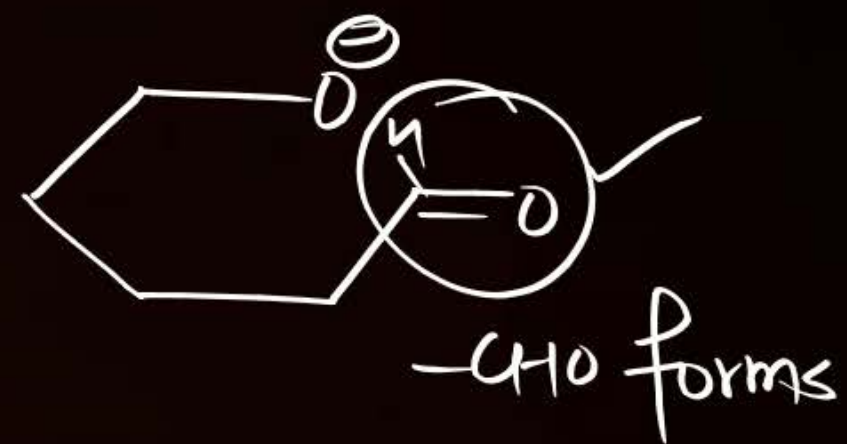
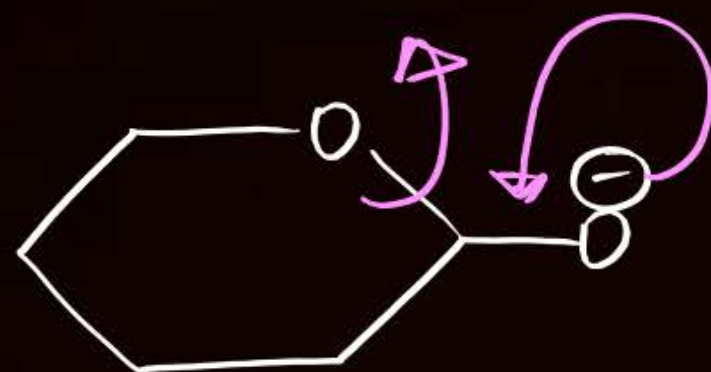
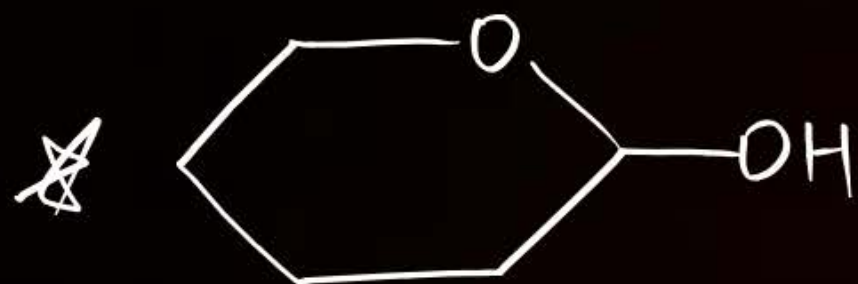
Overall Reaction



Q: Which of the following compound gives silver mirror with tollens reagent & red ppt with fehling solⁿ?







⑪ D-Glucose

⑫ α -D-Glucose

⑬ methyl- α -D-Glucose

⑭ β -D-fructose

⑮ Sucrose

⑯ Maltose

⑰ Lactose

⑱ Starch

Next class Discussion

- (1) M-H / RMgx last class
- (2) $\text{Red}^n(\text{C.R.} / \text{w.k.R.})$



THANK
YOU

