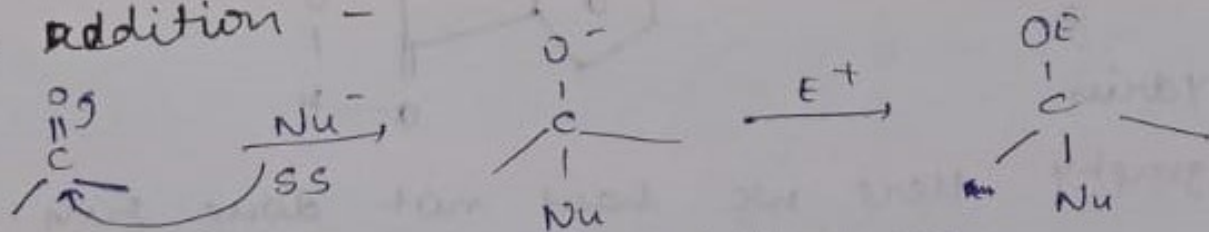


CHEMICAL REACTIONS OF ALDEHYDES AND KETONES

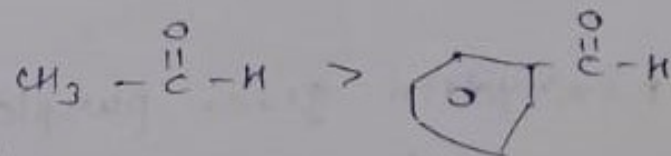
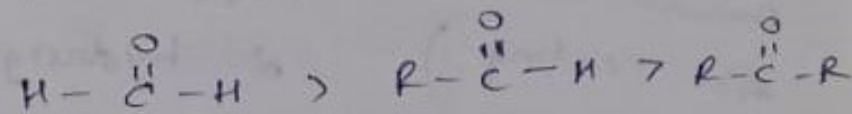
1) Nucleophilic addition -
New. Mech.



If Lewis acid is taken then follow ①

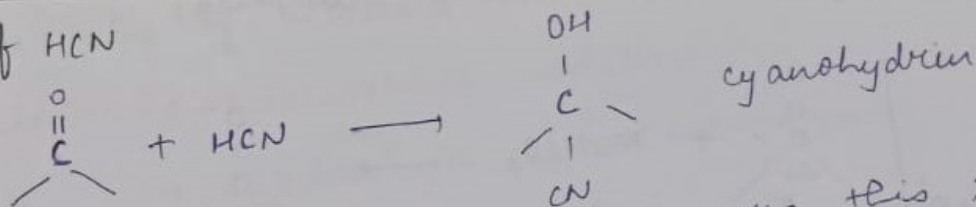
Rate (Aldehydes > Ketones)

Aliphatic > Aromatic

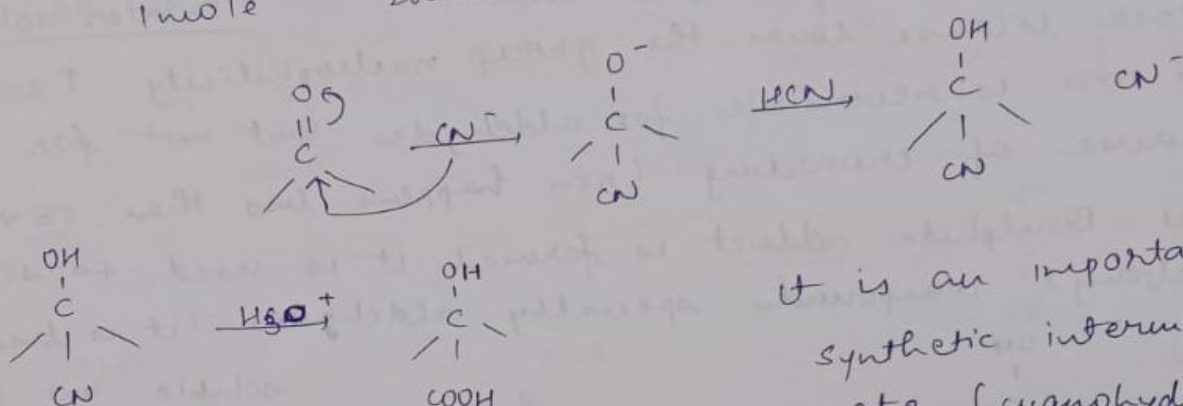
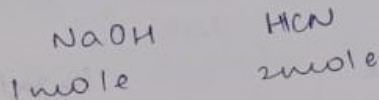


Hence Lewis acid will catalyse the rxn
due to crowding and +ve charge
ketone ↑

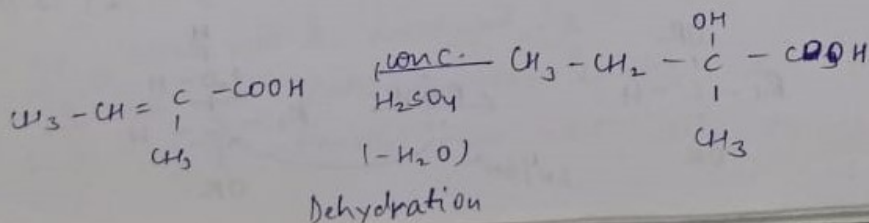
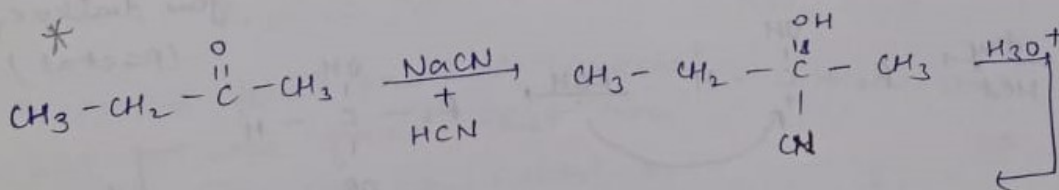
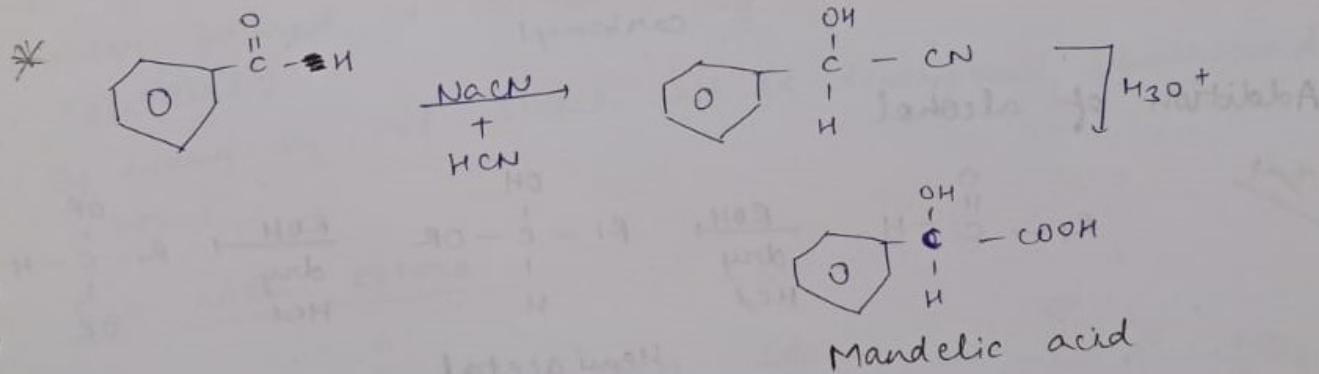
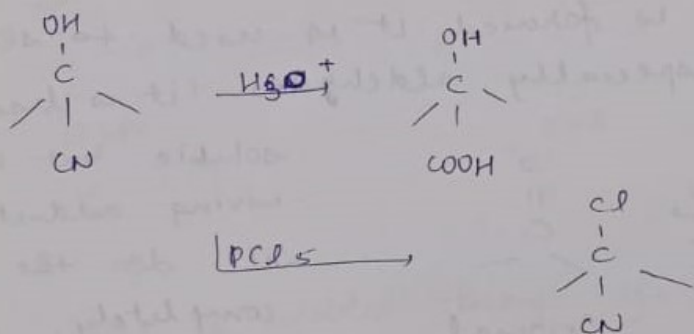
(2.) Addition of HCN



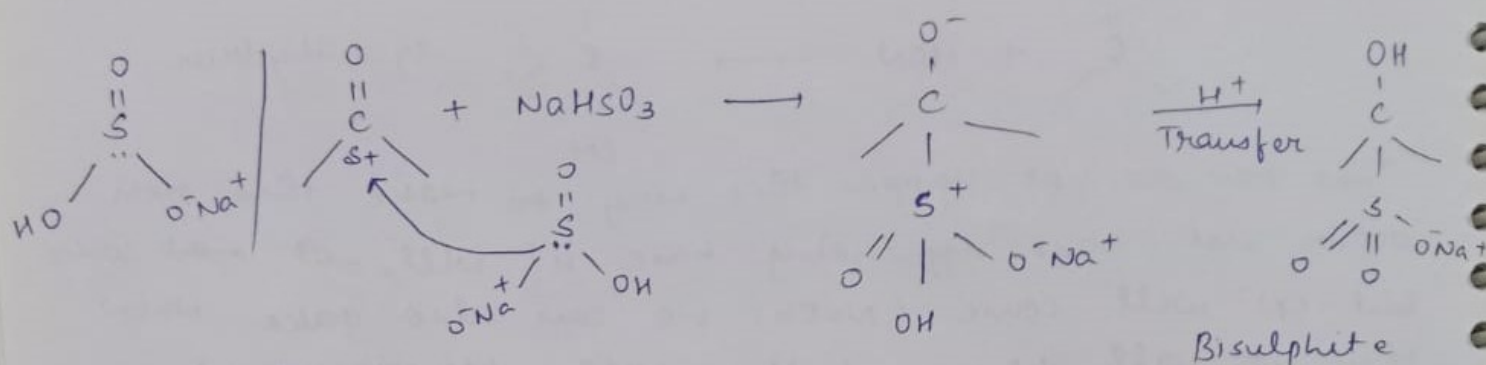
This rxn do not happen this way to make this rxn occur use base by using base H^+ will not ~~not~~ come but CN^- will come (NaOH) we can also take NaCN then it will be a buffer solⁿ. (NaCN + HCN)



It is an important synthetic intermediate. (cyanohydrin)



Addition of NaHSO₃ (sodium bisulphite)



Here attacking groups are

e⁻ and lone pair of sulphur

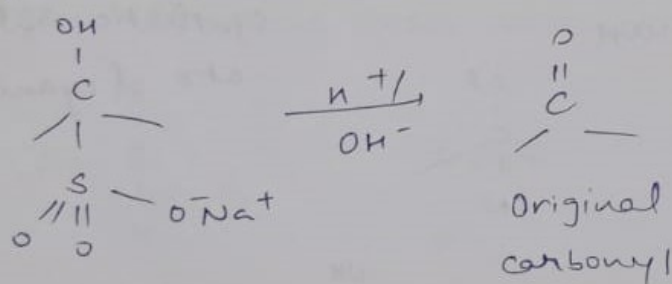
but lone pair of sulphur will

attack because down the group nucleophilicity ↑ ses.

This rxn is reversible for aldehydes but not for ketones because of crowding (rxn happens less than 50%).

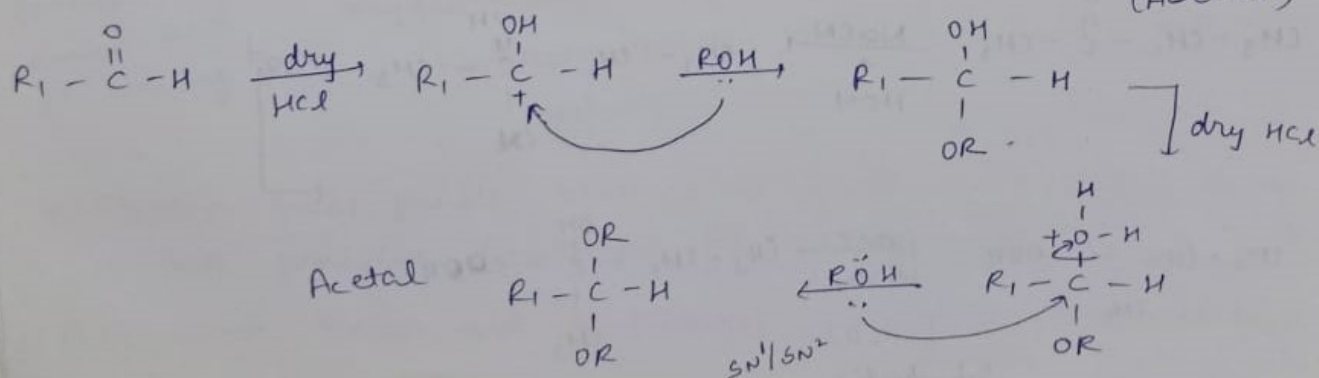
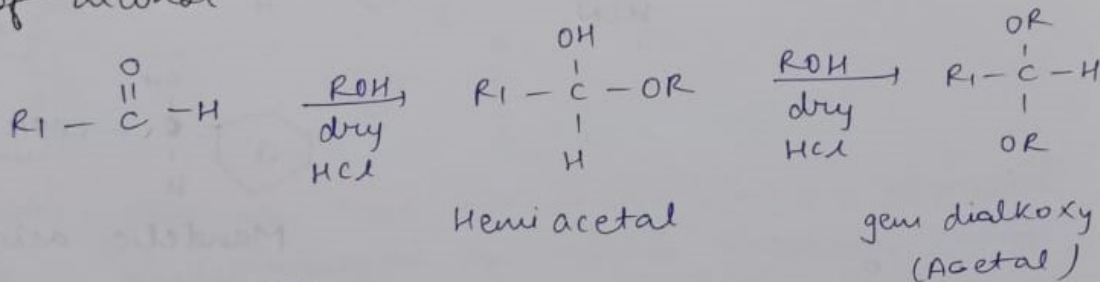
Here Bisulphite adduct is formed it is used to separate carbonyl compounds specially aldehydes (it is less

soluble but by mixing adduct it will do the rxn completely.

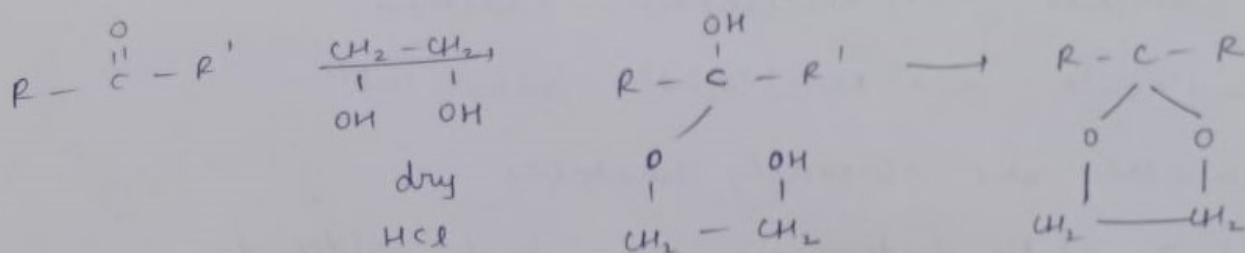


Addition of alcohol

V. Imp.

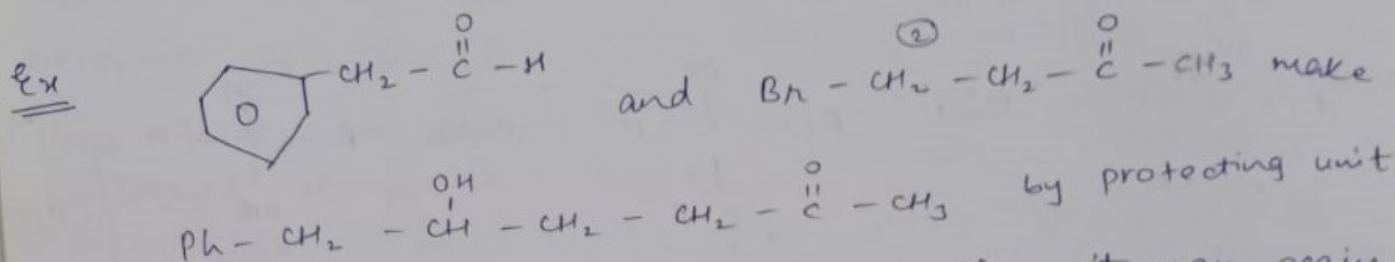


But by noticing the necessity to form it ketal was formed

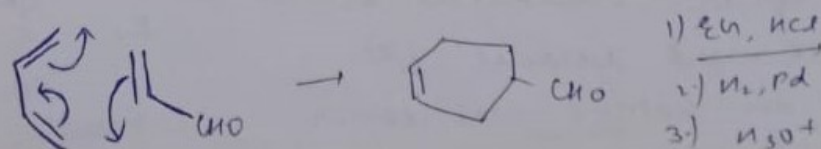
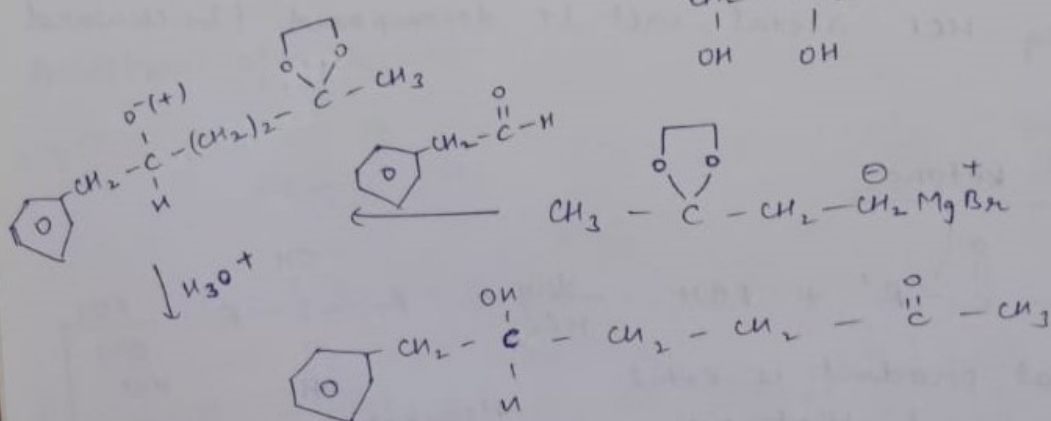
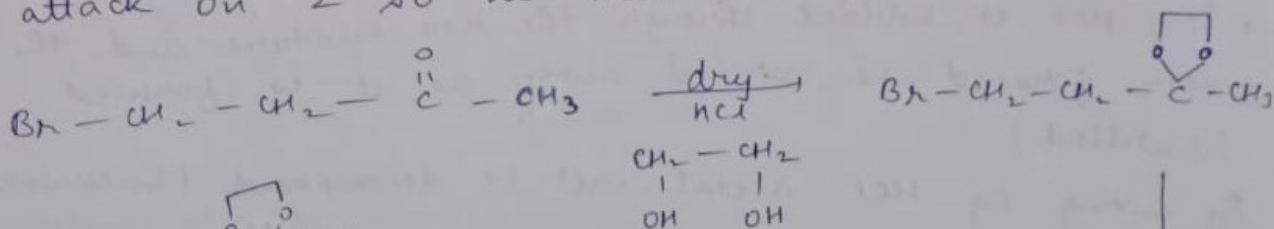


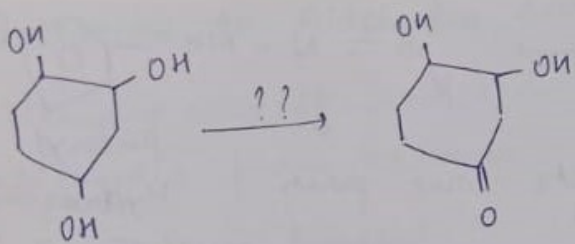
On acidic hydrolysis cyclic ketal gives back ketone

This concept is used for protecting aldehydes and ketones (but only in basic and neutral medium) in acidic medium this protecting unit disappears.

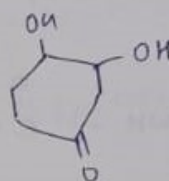
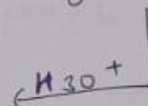
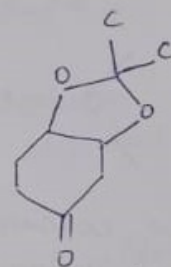
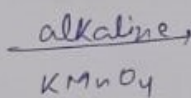
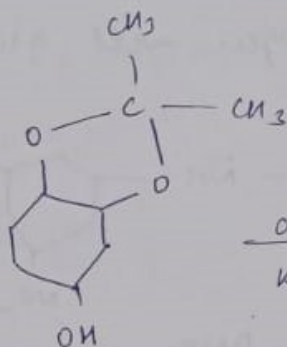
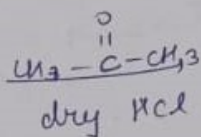
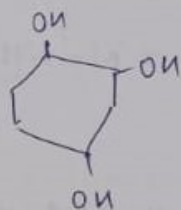


If we will make Grignard of 2 then it may again attack on 2 so we have to protect it.

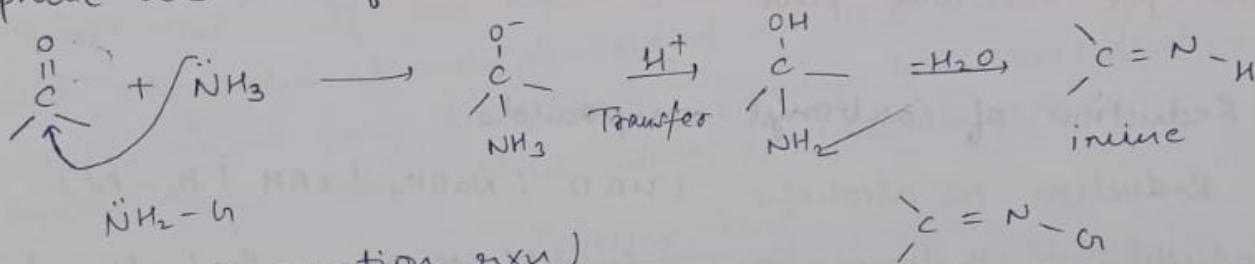




Ans.



Nucleophilic addition of ammonia and ammonia derivatives -



Medium should be mildly acidic because if more acidic medium is created oxygen will be protonated and +ve charge on carbon but nitrogen has given its lone pair so there will be no one to give carbon a lone pair. (pH should be 4-5)

Table 12-2

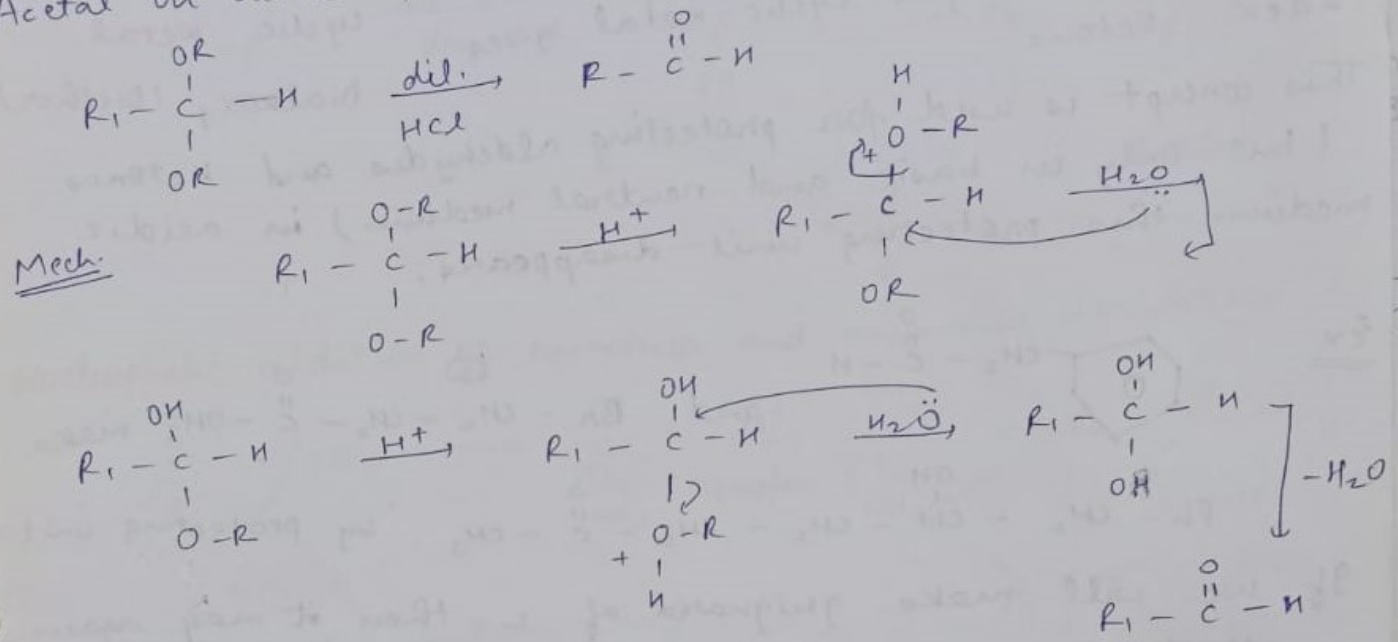
	<chem>R2C=O + NH3</chem>	\rightarrow	<chem>R2C=N-H</chem>	Imine
★★	<chem>R2C=O + NH2-R</chem>	\rightarrow	<chem>R2C=N-R</chem>	Substituted imine (Schiff's Base)
	<chem>R2C=O + NH2-OH</chem>	\rightarrow	<chem>R2C=N-OH</chem>	Oxime
	<chem>R2C=O + NH2-NH2</chem>	\rightarrow	<chem>R2C=N-NH2</chem>	HYDRAZONE

Here 2 molecules of alcohol are consumed.

1st molecule → Nucleophilic addition
 2nd molecule → Nucleophilic substitution

Hemiacetals are generally unstable

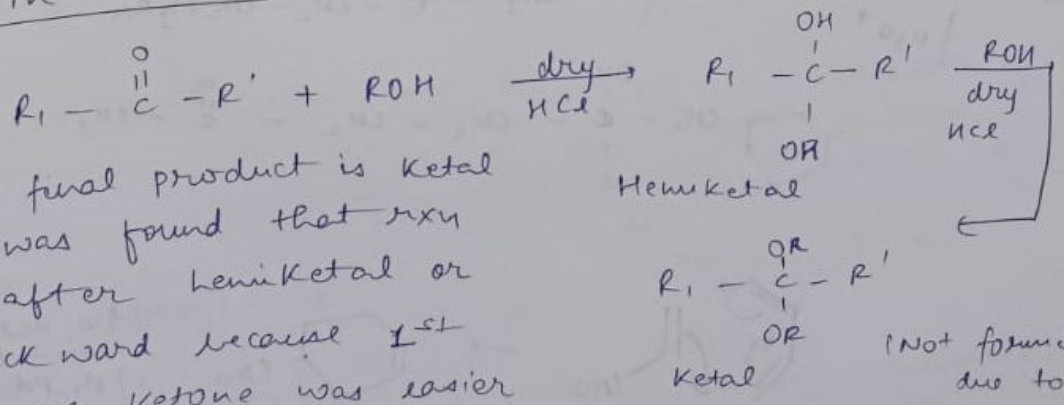
Acetal on acidic hydrolysis gives back aldehyde



→ Dry HCl is bubbled through the rxn mixture and the water formed is carried away as it is formed. (distilled)

By mixing aq. HCl acetal will be decomposed (backward rxn.)

Rxn with ketone



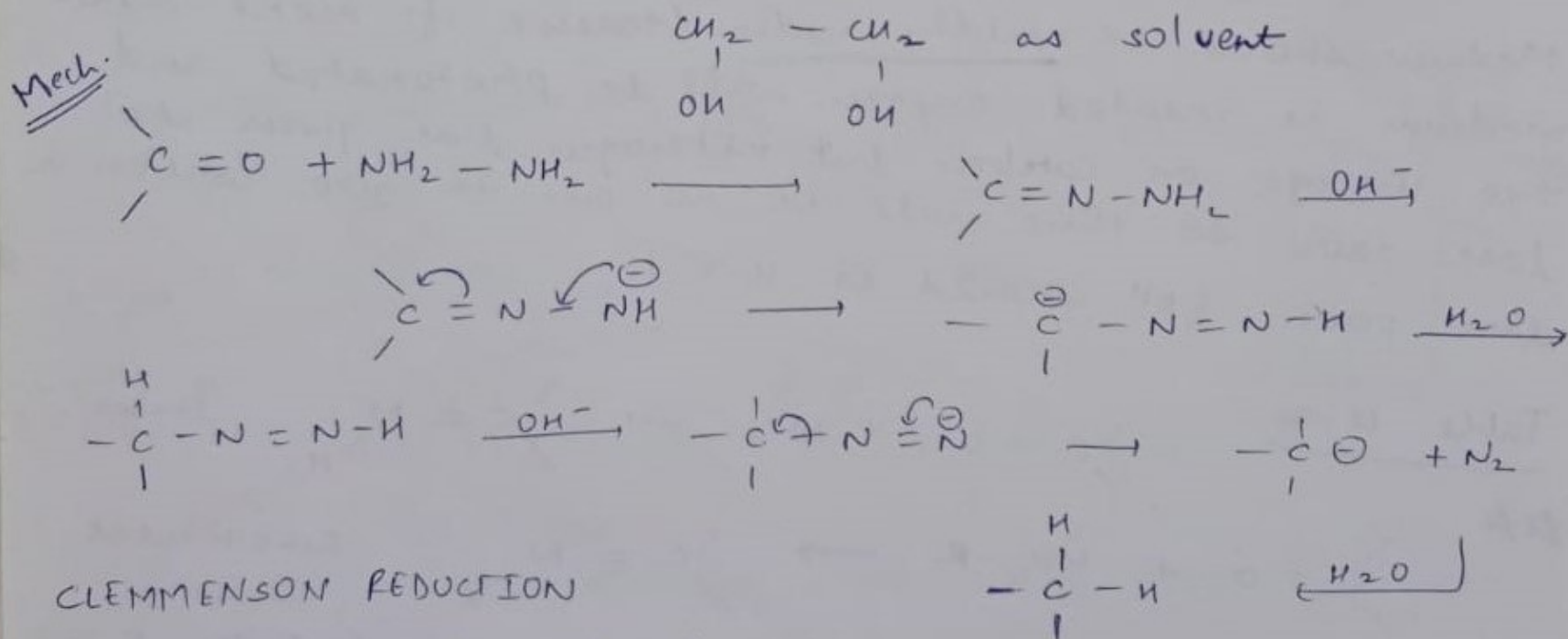
Expected final product is ketal but it was found that rxn stops after hemiketal or go backward because 1st attack on ketone was easier but 2nd attack was not due to crowding

(Not formed due to steric reasons)

→ Reduction of carbonyl compounds.

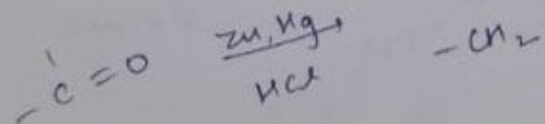
Reduction to alcohols (HBO / NaBH₄ / LAH / H₂-Pd)

Reduction to Hydrocarbons (Wolff Kishner Reduction)

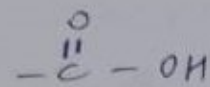
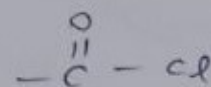


CLEMMENSON REDUCTION

Mechanism not yet clear



Not applicable for



(only for

