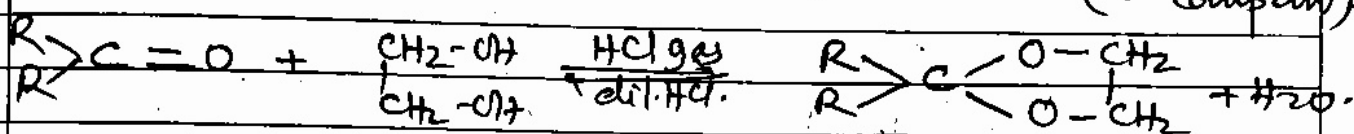
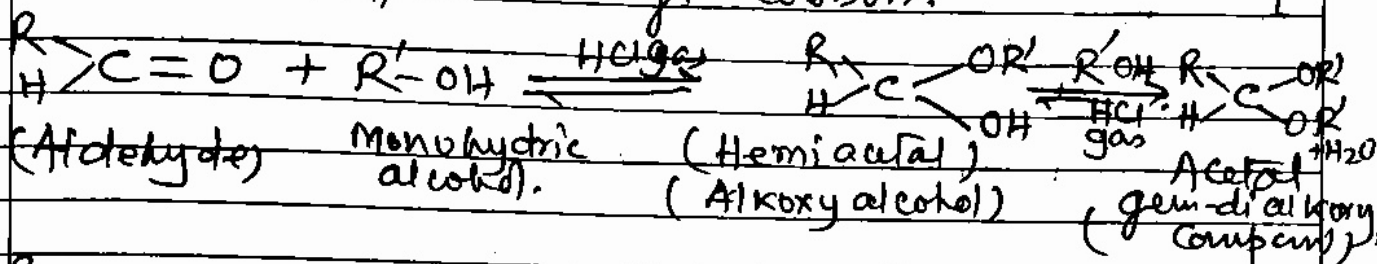


The role of dry HCl is it protonates the oxygen atom of Carbonyl compounds and therefore increases the electrophilic character of Carbonyl Carbon.



(B) Nucleophilic addition reaction followed by elimination.

Addition of ammonia & their derivatives:

The derivative of NH_3 are five mainly in which one hydrogen of NH_3 is removed and other part is added (which is also called 2).

The derivative of NH_3 are as follows

1. Ammonia — NH_3 or $\text{NH}_2\text{-H}$
2. Hydroxylamine: $\text{NH}_2\text{-OH}$
3. Hydrazine $\text{NH}_2\text{-NH}_2$
4. Phenyl hydrazine $\text{NH}_2\text{-NH}\cdot\text{C}_6\text{H}_5$ or $\text{NH}_2\text{-NH}\cdot\langle\text{O}\rangle$
5. 2,4-dinitrophenylhydrazine: $\text{NH}_2\text{-NH}\cdot\langle\text{O}\rangle\text{NO}_2$
~~also~~ (2,4 DNP)
6. Semicarbazide $\text{NH}_2\text{-NH-CONH}_2$

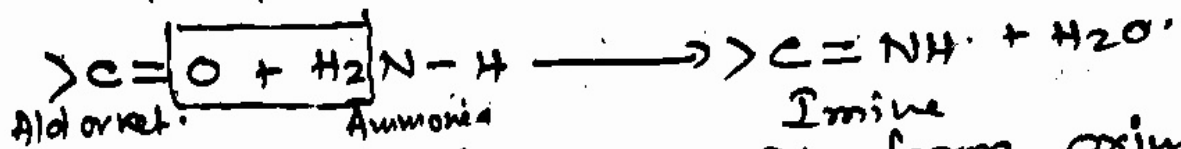
During reaction H_2 of above compound will combine with 'O' of $\text{C}=\text{O}$ & it will

be eliminated in the form of water and rest part will be added (Must contain C=N) to form final product.

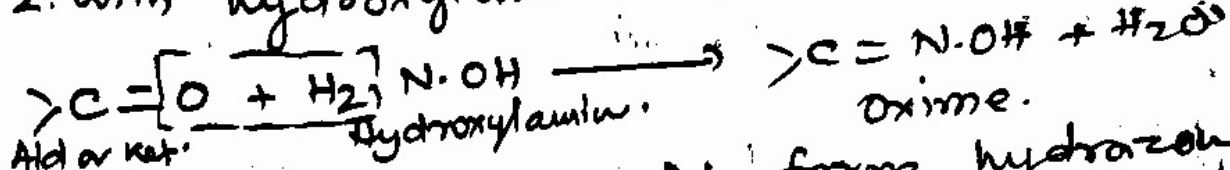
The chemical reactions are as follows:

A: ~~with hydroxylamine~~:-

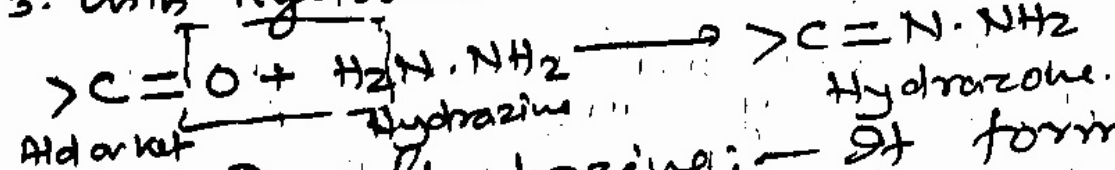
1. With Ammonia:- It forms Imine.



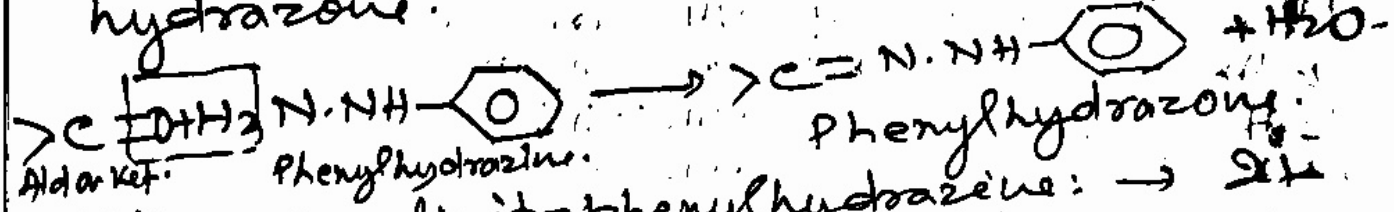
2. With hydroxylamine:- It forms oxime.



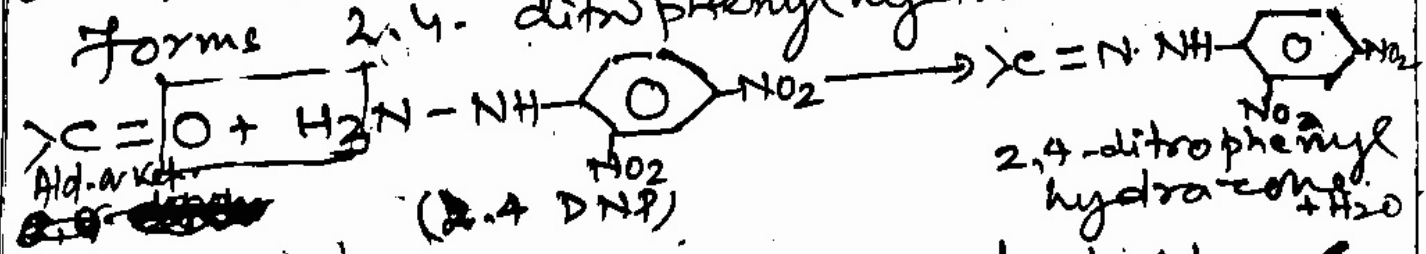
3. With hydrazine:- It forms hydrazone.



4. With Phenylhydrazine:- It forms phenyl hydrazone.

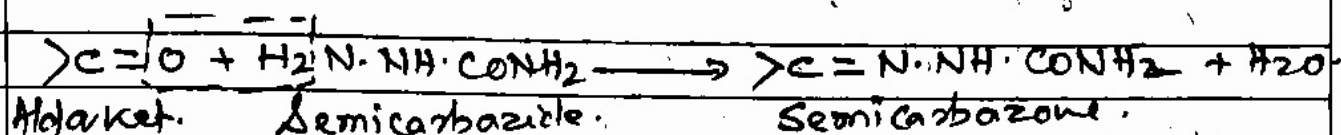


5. With 2,4-dinitrophenylhydrazine:- It forms 2,4-dinitrophenylhydrazone.



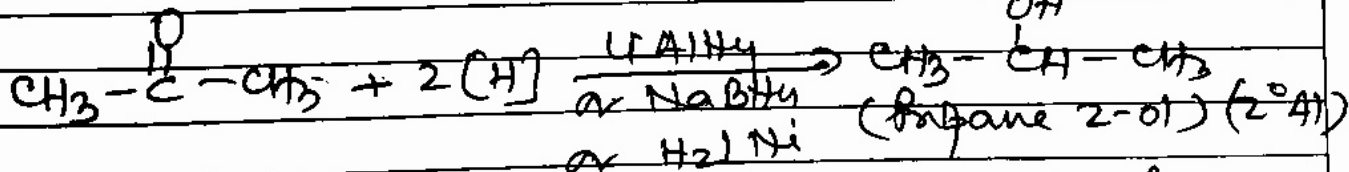
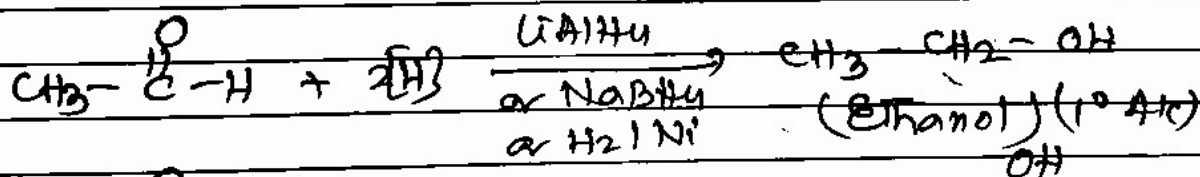
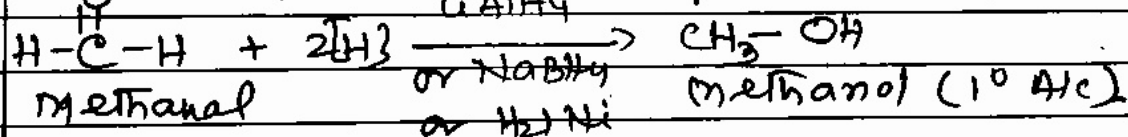
Note: The colour of 2,4-~~DNP~~ dinitrophenyl hydrazone may have red, orange or yellow (ROY) colour.

6. With Semicarbazide: - It forms Semi-carbazone.



[C] Reduction reaction: $\rightarrow$

When Aldehyde or ketone is reduced then it may form alcohol or alkane which depends on the type of reagent. For example in presence of $LiAlH_4$, $NaBH_4$, Na/C_2H_5OH , H_2/Ni or Pd or Pt Aldehyde or Ketone is reduced to Alcohol but in presence of $Na-Hg/HCl$, $NH_2-NH_2/KOH/Glucol$, $HI/Red P$ it forms alkane.



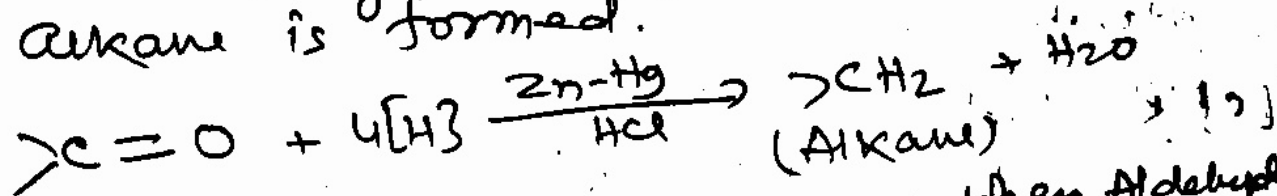
Note: On reduction in presence of $LiAlH_4$ or $NaBH_4$ or H_2/Ni or Pd or Pt aldehyde is reduced to 1^o Alcohol whereas ketone is reduced to 2^o Alcohol.

Teacher's Signature: _____

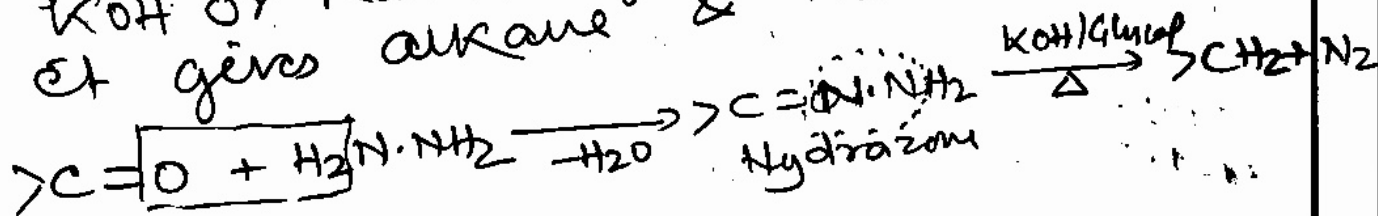
(30)

Reduction in presence of Zn-Hg or Na-Hg/HCl or $\text{NH}_2\text{-NH}_2/\text{KOH}$ /Glycol:-

1. Clemmensen reduction: When aldehyde or ketone is reduced in presence of Zinc-Amalgam (Zn-Hg) or Na-Hg/HCl then alkane is formed.



2. Wolf Kishner reduction → When Aldehyde or ketone is reduced in presence of $\text{NH}_2\text{-NH}_2$ first it forms hydrazone and further when treated in presence of KOH or NaOH/Ethylene Glycol & Heat it gives alkane & N_2 .

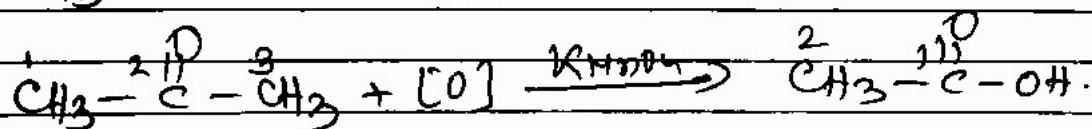
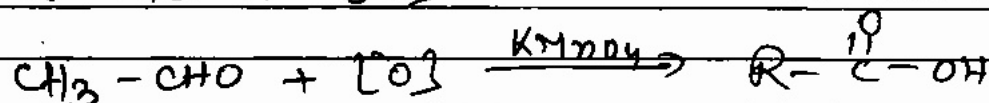
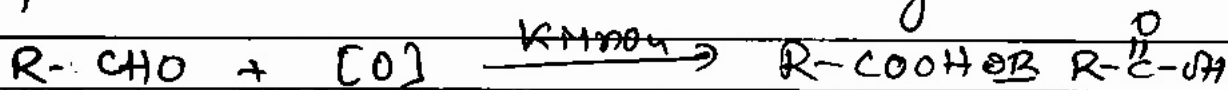


① Oxidation: →

Oxidation of Aldehyde and ketone is possible by two types of oxidising agent. One is strong oxidising agent i.e. KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$ and other is by weak oxidising agent like Tollen's reagent ($\text{Ag}(\text{NH}_3)_2^+$) & Fehling solution (A mixture of Na-K-tartrate & CuSO_4 solution) in basic medium.

Imp Note : Tollen's reagent $[Ag(NH_3)_2]^+$ & Fehling Solution (equimolar mixture of Na-K-tartrate & $CuSO_4$ solution) are used to identify Aldehyde & Ketone. Aldehyde gives positive test of Tollen's reagent & Fehling Solution whereas Ketone do not respond for this, in this way we can identify Aldehyde & Ketone.

When aldehyde is oxidised in presence of $KMnO_4$ or $K_2Cr_2O_7/H^+$ then it gives Carboxylic acid having same no. of Carbon atom, but when Ketone is oxidised by strong oxidising agent like $KMnO_4$ or $K_2Cr_2O_7$ in acidic medium it gives Carboxylic acid but no. of Carbon atom decreases by one.

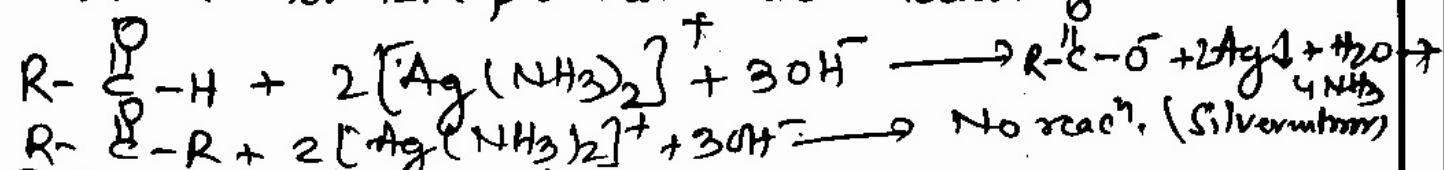


Tollen's test : $\rightarrow$ Ammonical Silver nitrate solution ($NH_4OH + AgNO_3$) is called Tollen's reagent. NH_4OH & $AgNO_3$ on combination gives a complex compound i.e. $[Ag(NH_3)_2]^+$ is also called Tollen's reagent.

Teacher's Signature : _____

(22)

Tollen's reagent is a kind of ~~weak~~ mild or weak oxidising agent which convert $R-CHO$ to $R-COO^-$ (Carboxylate) & give silver mirror ($Ag \downarrow$) which is the test for Aldehyde, because ketone do not give this test. Reaction take place in basic medium.



Fehling Solution test: $\rightarrow$

$Na-K$ -tartrate (Rochelle salt) & $CuSO_4$ solution are mixed in equimolar ratio, this mixture is called Fehling solution, which oxidises to Aldehyde & give Carboxylate ion including red ppt of Cu_2O , which is the test for aldehyde, ketone do not give this test.

