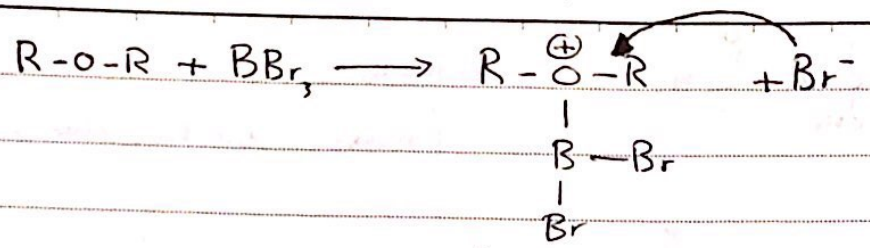
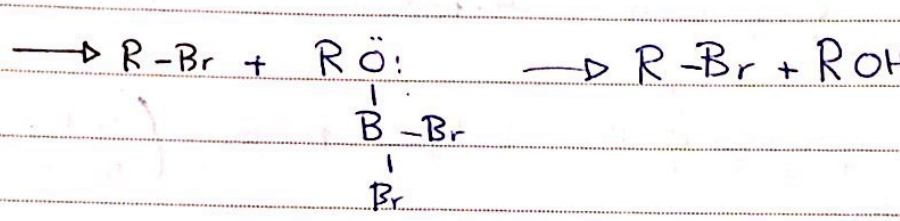
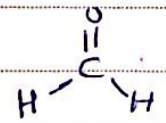
NO.



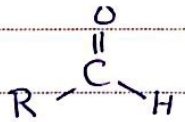


Chapter (9) : Aldehydes & Ketones

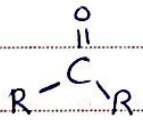
carbonyl group



formaldehyde ← common name . methanal

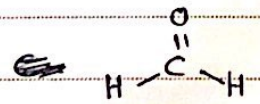


aldehyde

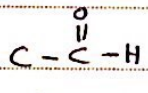


ketone

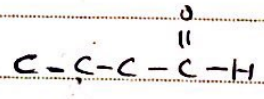
9.1) Naming aldehydes and ketones



methanal



ethanal



butanal

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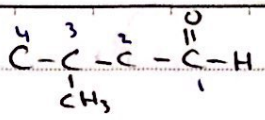
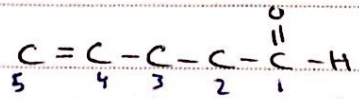
NO. Chapter (9)

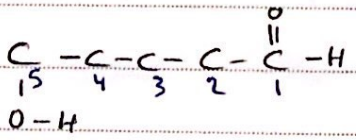


3-methyl butanal

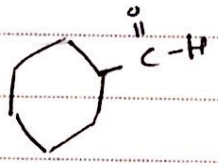
(numbering start from ~~aldehyde~~ carbonyl)



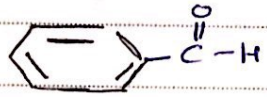
4-pentanal (carbonyl has priority)



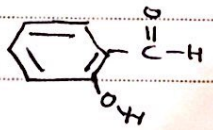
5-hydroxy pentanal (carbonyl has priority)



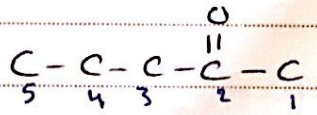
cyclo hexan carbaldehyde



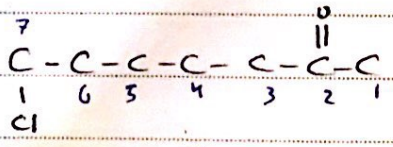
benzaldehyde

* 

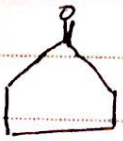
o- hydroxy benzaldehyde



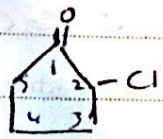
2-pentanone



7-chloro-2-heptanone



Cyclo pentanone



2-chloro cyclo pentanone

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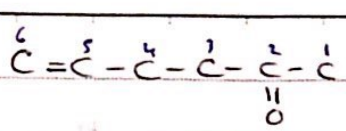
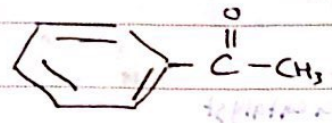
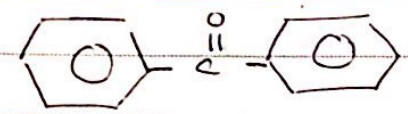


5-hexen-2-one



acetophenone



benzophenone

not included → 9.2) Some common aldehydes and ketones

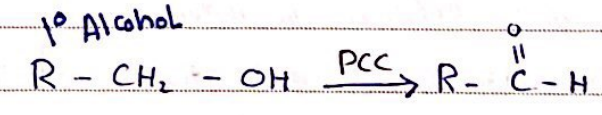
just know acetone

acetone is used as a solvent because it is protic.

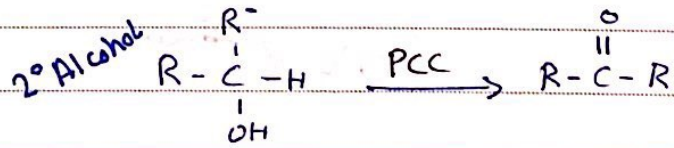
9.3) Synthesis of aldehydes and ketones ← basically a revision of previous rxns

[1] Oxidation of alcohols

1° Alcohol

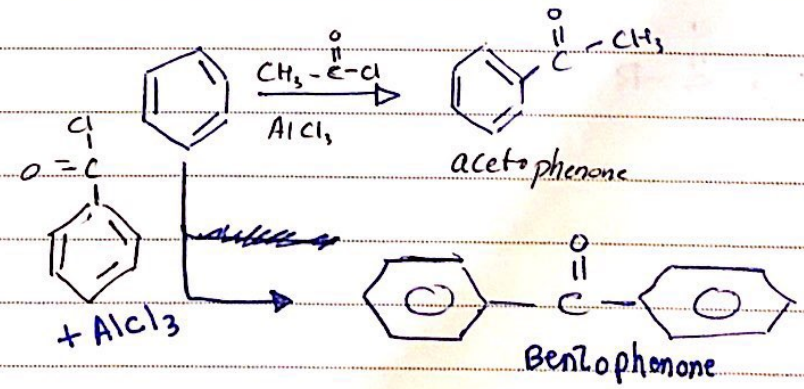


2° Alcohol



← Prime means that it could be the same or different R.

[2] Aromatic Ketones



acetophenone

Benzophenone

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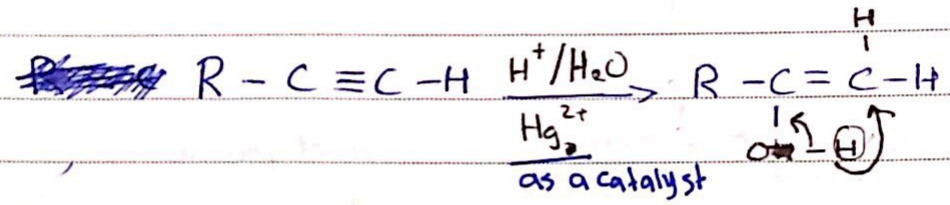
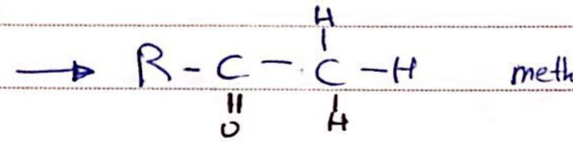
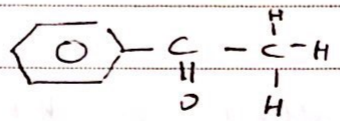
NO.

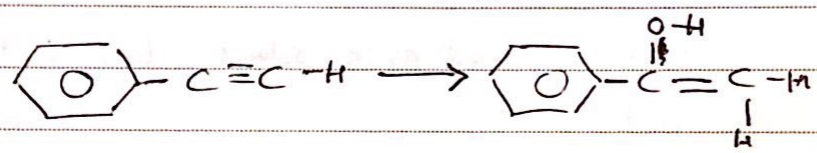
3) Methyl Ketones

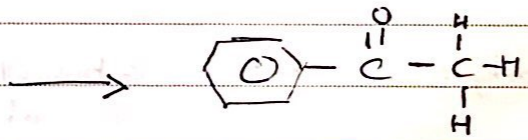




methyl ketone

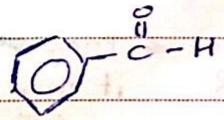
e.g. prepare  starting with an alkyne:



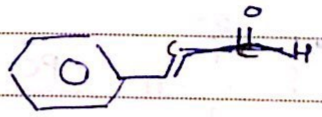


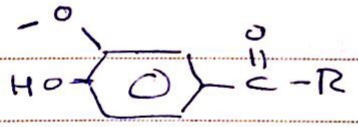
9.4) Aldehydes and Ketones in nature

Know the names and structures of the examples



benzaldehyde





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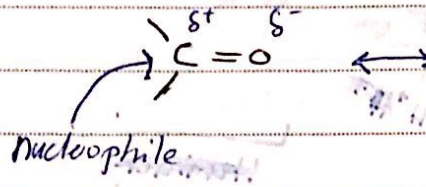
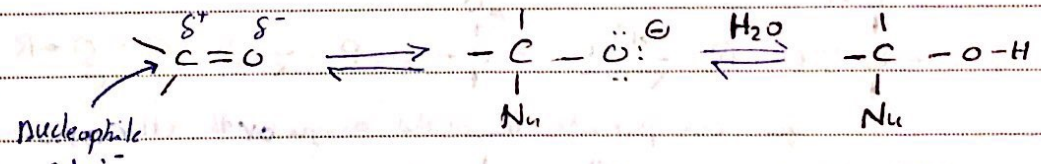
NO.

9.5) The carbonyl group

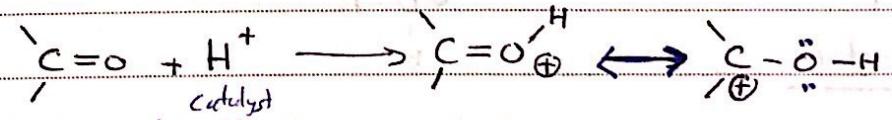


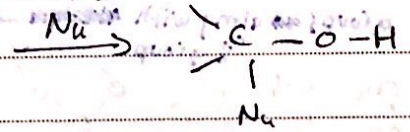
	C-C-C-C-C-C	C-C-C-C-C(=O)-H	C-C-C-C-C-OH
b.p.	69	102	118
		1) dipole-dipole	H-bonding
	~~Alcohol can make one hydrogen bond with another alcohol molecule~~	2) can hydrogen bond with water	

9.6) Nucleophilic addition to carbonyl groups



nucleophilic addition rxn





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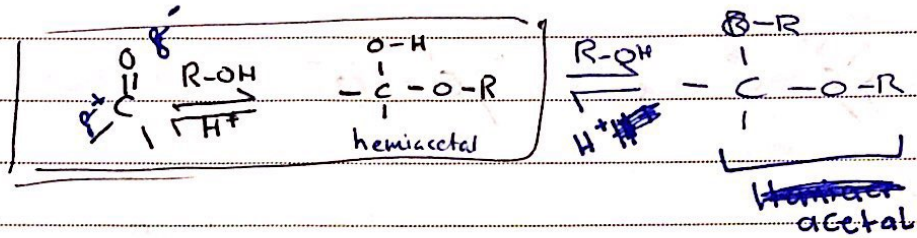
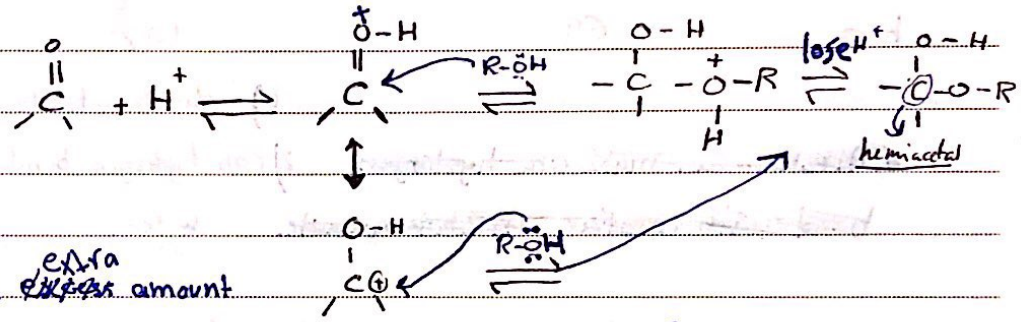
9.7) Formation of alcohols ; formation of hemiacetals and acetals

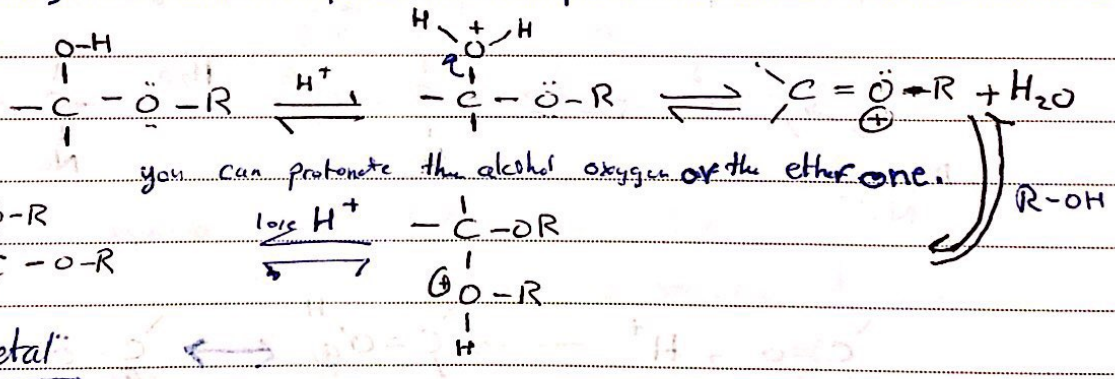


Mechanism:-

hemiacetal: compound has C connected to an alcohol and an ether oxygen

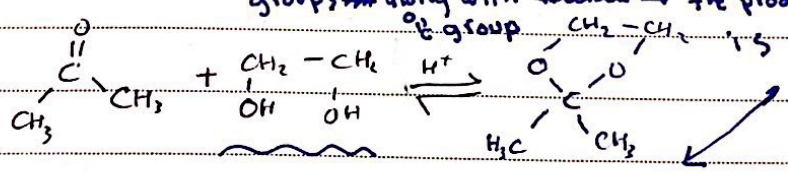


- Note:- when we have extra amount of Alcohol, hemiacetal compounds will complete reaction to form acetal compounds.



acetal: compound has C connected to 2 ethers.

when there is a reactant with 2 OH groups along with a C group → the product is



cyclic acetal

THIS IS THE THE CHEMISTRY OF SUGARS

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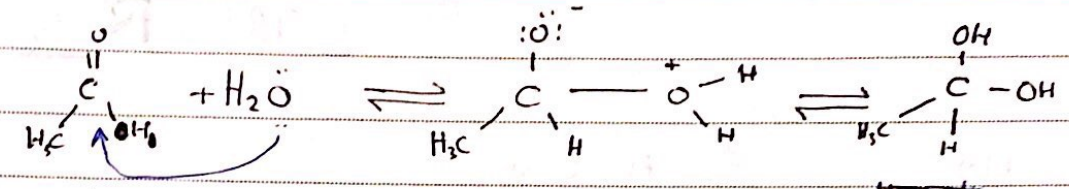
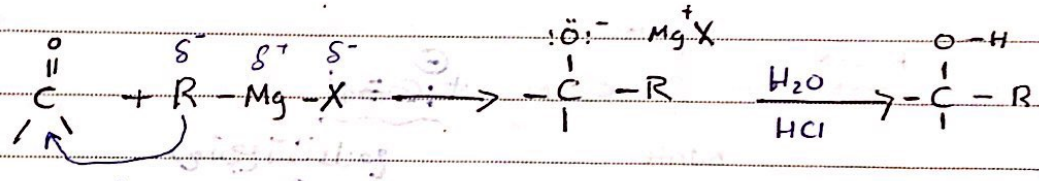
NO.

9.8) Addition of water

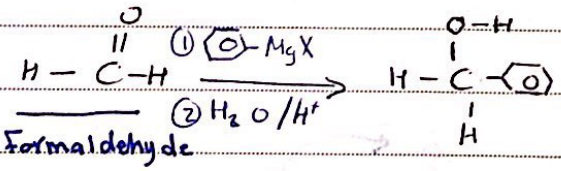


- Hydrate is very reactive molecule in oxidation of Alcohols. Hydrate to aldehydes.

9.9) Addition of R − MgX and R − C≡C⊖

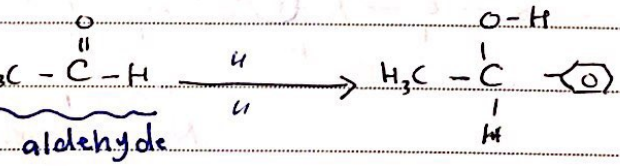


Methods of preparing alcohols:- (A) Addition of R−MgX



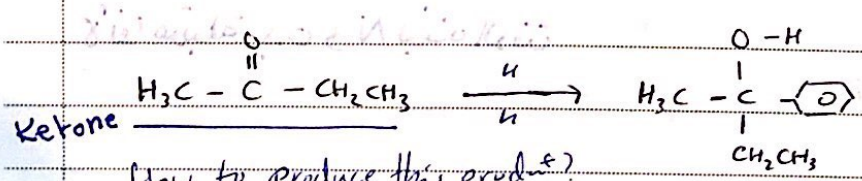
Formaldehyde

1° alcohol



aldehyde

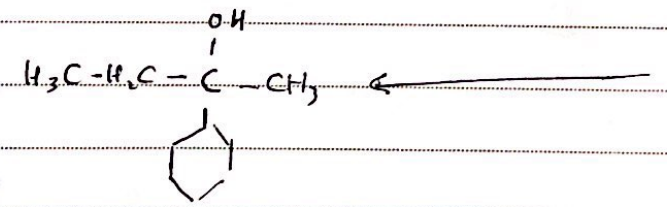
2° alcohol



Ketone

3° alcohol

How to produce this product?



We can use the CH_3, CH_3CH_2, ⬡ as the grinnard therefore, we have 3 combinations to get the product

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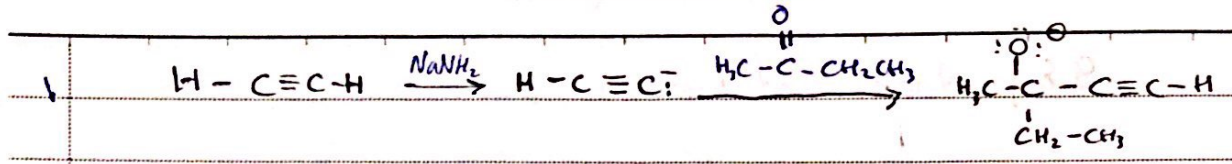
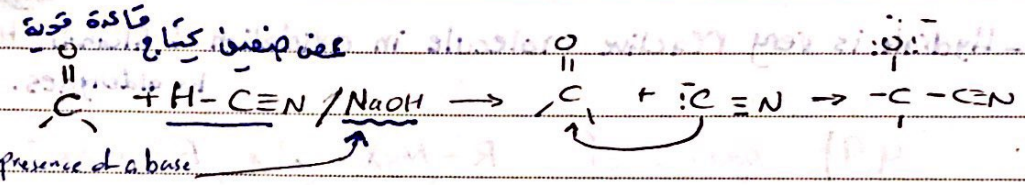
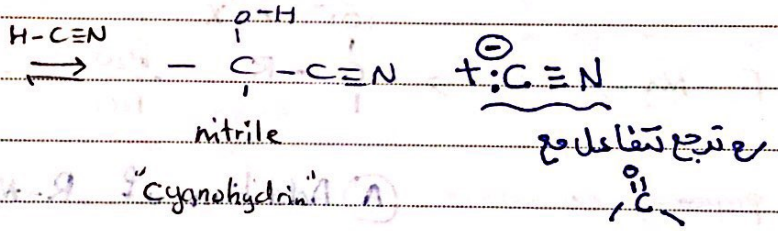


CHAPTER 3

9.10) Addition of H-C≡N

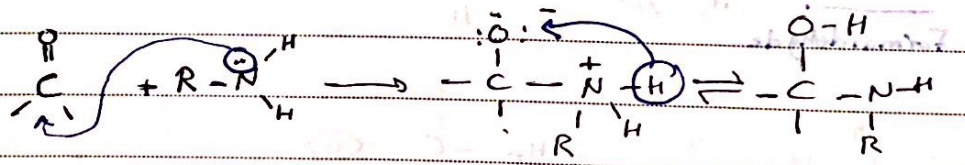
قاعدة قوية
عمل ضغط كتابع





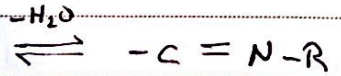
رح ترجع تتفاعل مع

9.11) Addition of nitrogen nucleophile



aminal
NOT STABLE

لأنها متبلة بـ O و N بنفس الوقت



imine

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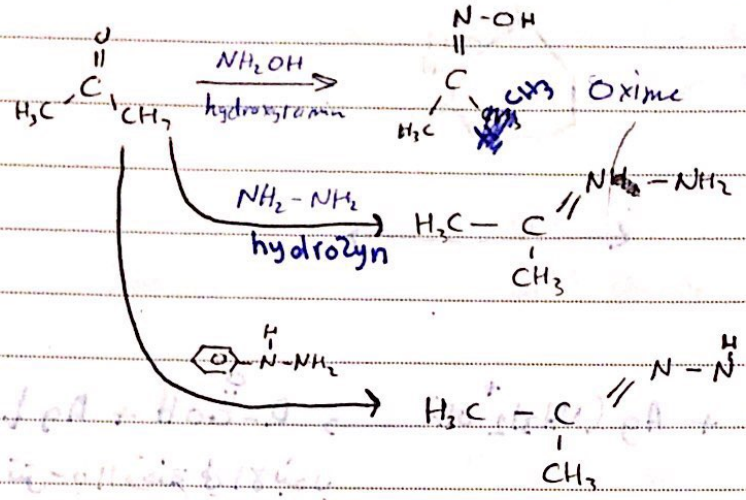
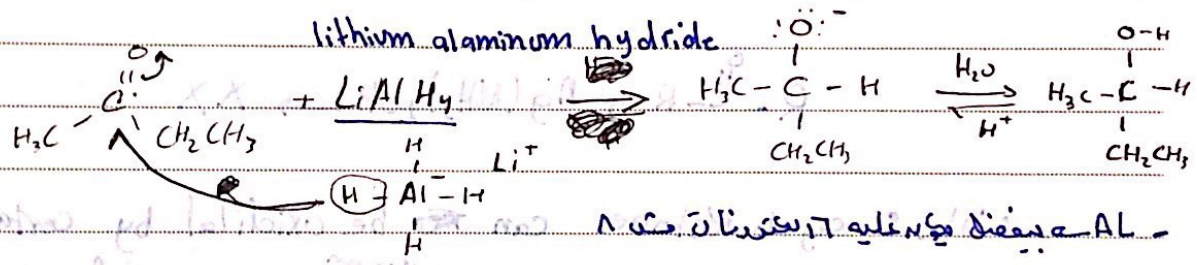
NO.

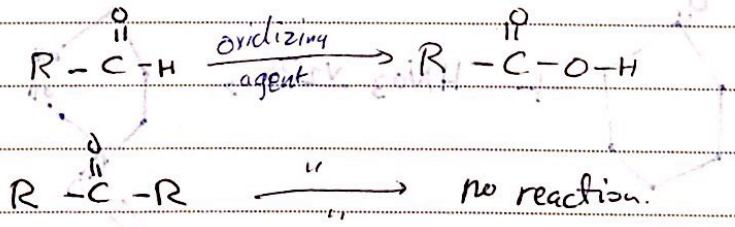


9.12) Reduction of carbonyl compounds

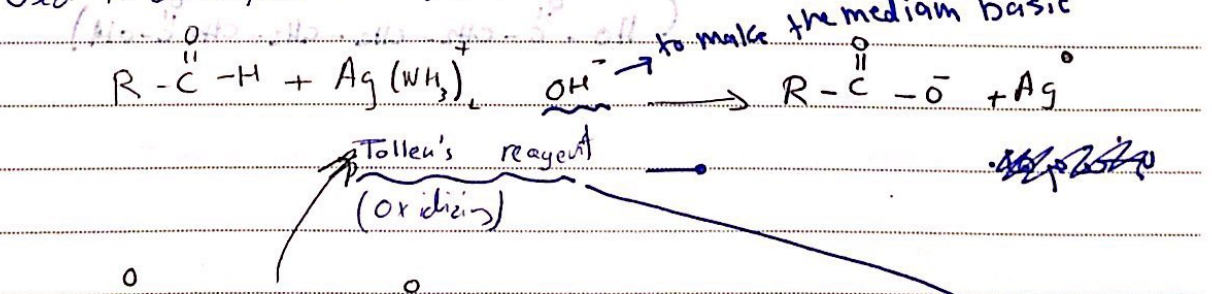


- AL ـ بيعطي مكان عليه الكتروناته مثل H
ويتبرع بذرة H مع الكتروناتها

9.13) Oxidation of carbonyl compounds



Used to distinguish aldehydes from ketones



* نستخدمه عشان التمييز بين الألديهايد والكيتون.

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NO.

Chapter 9

9.9

(B) - Addition of $H-C\equiv C^{\ominus}$

- $H-C\equiv C-H \xrightarrow{NaNH_2} H-C\equiv C^{\ominus}:Na^{\oplus} \xrightarrow{CH_3-\overset{\delta}{\overset{\|}{C}}-CH_3}$

$$H-C\equiv C-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-CH_3 \xleftarrow{H_2O/H^+} H-C\equiv C-\underset{CH_3}{\overset{:\ddot{O}:^{\ominus}}{\underset{|}{\overset{|}{C}}}}-CH_3$$

this compound can be involved in the rxns of Alkyne.

$$H-C\equiv C-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-CH_3 \xrightarrow{2H_2/Pt} CH_3-CH_2-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-CH_3$$

$$\xrightarrow{H_2/\text{lindler catalyst}} CH_2=CH-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-CH_3$$

$$\xrightarrow[H^+/Hg_2^+]{H_2O} CH_3-\overset{O}{\overset{\|}{C}}-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-CH_3$$

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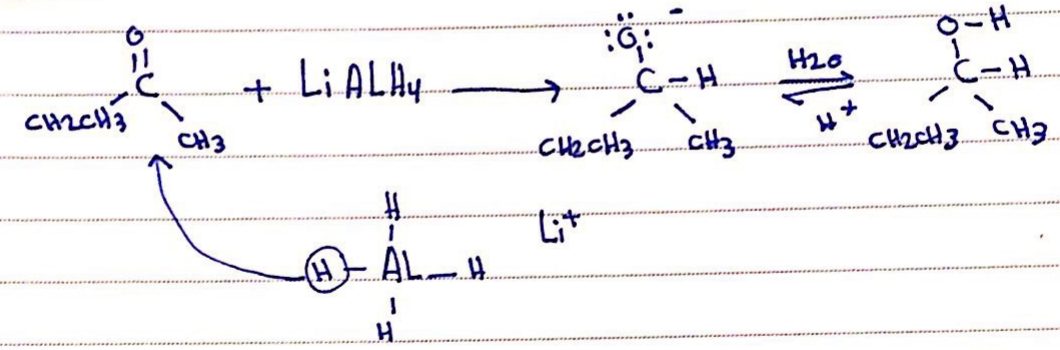
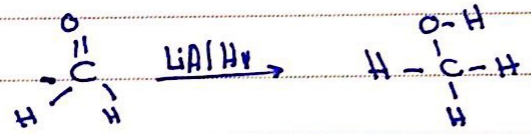
Chapter 9

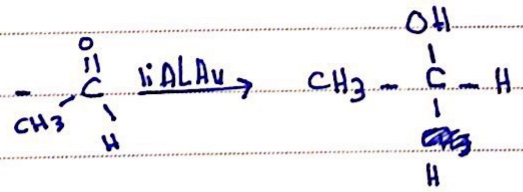
9.12 Reduction of Carbonyl Compounds



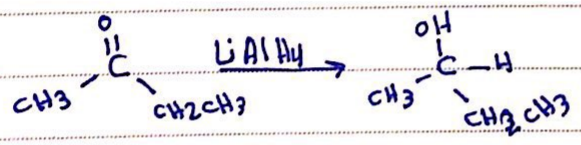
* ذرة الألمنيوم تعطي بكل مدارها ٦ إلكترونات عشان ٨ ـــ ع تتشارك بذرة H مع إلكتروناتها للأكسجين.



methanol



Ethanol 1° alcohol



2° Alcohol

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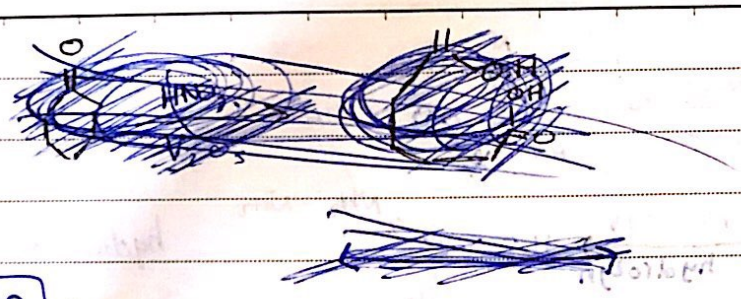


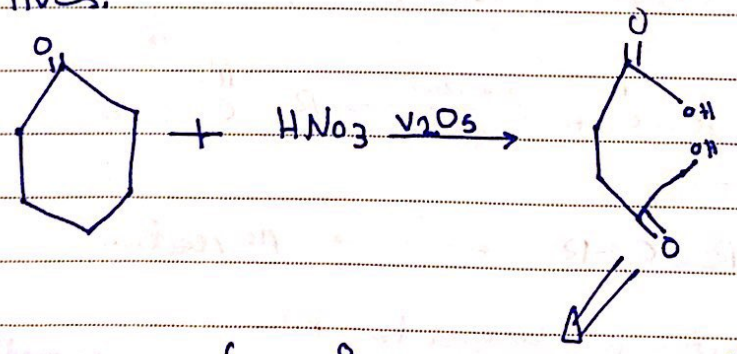
9.13

$$R-\overset{O}{\overset{\|}{C}}-H + Ag(NH_3)_2^{+}OH^{-} \longrightarrow R-\overset{O}{\overset{\|}{C}}OH + Ag\downarrow$$

ثم تترسب الفضة في الابيوب
على شكل مرآة .

$$R-\overset{O}{\overset{\|}{C}}-R + Ag(NH_3)_2OH \longrightarrow XX$$

- Note: cyclo Ketones can be oxidized by certain oxidizing agent → as we need it in many artificial aspects in our lives.



$$\left(HO-\overset{O}{\overset{\|}{C}}-CH_2-CH_2-CH_2-CH_2\overset{O}{\overset{\|}{C}}-OH \right)$$

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