Preparation of Aldehyde & Ketone :-

We can prepare aldehyde by several methods but the some important methods for the preparation of aldehyde and ketones are as follows :-

1. By alcohol's oxidation :->

When 1° alcohol is oxidised in presence of CrO_3 or MnO_2 it form aldehyde.

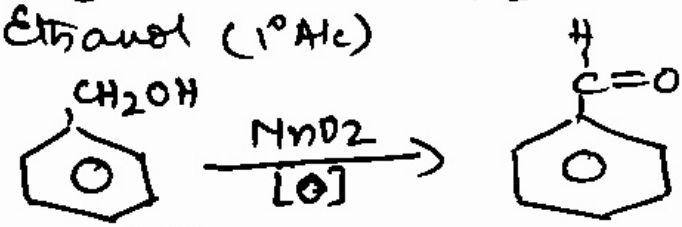
When 2° Alcohol is oxidised in presence of MnO_2 it form ketones.

$$CH_3OH \xrightarrow[[O]]{CrO_3} H\text{-}CHO$$

Methanol (1° Alc)

$$CH_3\text{-}CH_2\text{-}OH \xrightarrow[[O]]{CrO_3} CH_3\text{-}CHO$$

Ethanol (1° Alc)



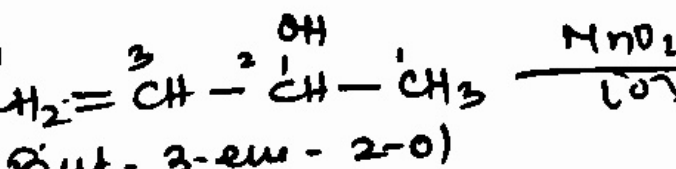
Benzyl Alc (1° Alc)

Benzaldehyde.

$$CH_2=CH-CH_2-OH \xrightarrow[[O]]{MnO_2} CH_2=CH-CHO$$

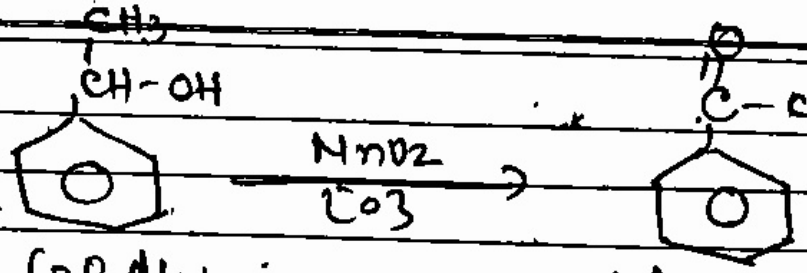
(Allyl Alc) (1° Alc)

Prop-2-en-1-al



But-3-en-2-ol (2° Alc)

But-3-en-2-one.



(2° Alc) (Acetophenone)
(Methyl Phenyl ketone)

(2) Dehydrogenation (Removal of hydrogen) of Alcohol:- In this method we pass the vapour of alcohol through Copper tube, during the process hydrogen is removed (a kind of oxidation) although 1° Alcohol gave aldehyde, 2° Alcohol gives ketone & 3° alcohol generally do not go for dehydrogenation or oxidation if it is oxidised in drastic condition it gives alkene.

$$CH_3-CH_2-OH \xrightarrow[\Delta]{Cu\ tube} CH_3-\overset{O}{\overset{\|}{C}}-H$$
(Ethanol) (Ethanal)

$$CH_3-\underset{OH}{CH}-CH_3 \xrightarrow[\Delta]{Cu\ tube} CH_3-\overset{O}{\overset{\|}{C}}-CH_3$$
(Propan-2-ol) Propan-2-one

(3) Ozonolysis of alkene :→ (By Hydrocarbon) Whenever alkene goes for reaction with Ozone in presence of CCl_4 it form ozonide, during formation of ozonide double bond of alkene breaks and three oxygen atoms are added in form of triangle & further it is hydrolysed in presence of Zinc then it gives aldehyde or ketone depends on reactant, this entire reaction is called Ozonolysis.

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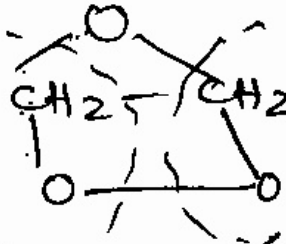
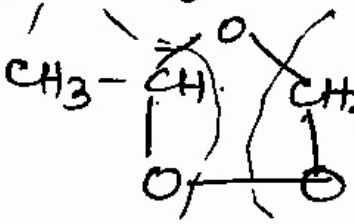
Trick: To know the product break the double bond of alkene and add one oxygen atom in each side of carbon you will get real product.

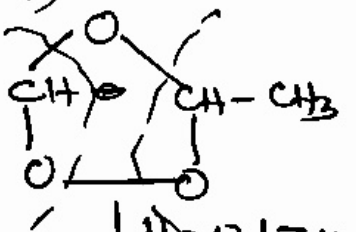
1. $CH_2 = CH_2 \xrightarrow[CCl_4]{O_3}$  $\xrightarrow[Zn]{H_2O}$ $2\,H-\overset{O}{\overset{\|}{C}}-H$
(Ethene) Methanal

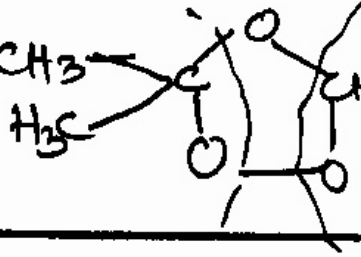
2. $CH_3-CH=CH_2 \xrightarrow[CCl_4]{O_3}$  $\xrightarrow[Zn]{H_2O}$ $CH_3-\overset{O}{\overset{\|}{C}}-H$ + $H-\overset{O}{\overset{\|}{C}}-H$
(Propene) Ethanal Methanal

By trick

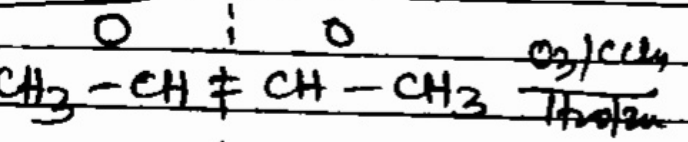
$CH_2 \neq CH_2 \longrightarrow 2\,HCHO$ is formed.
(HCHO, HCHO)

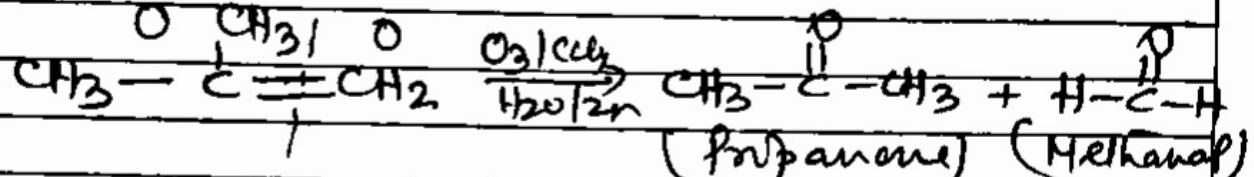
$CH_3-CH \neq CH_2 \longrightarrow CH_3-\overset{O}{\overset{\|}{C}}-H + H-\overset{O}{\overset{\|}{C}}-H$
(Ethanal) (Methanal)

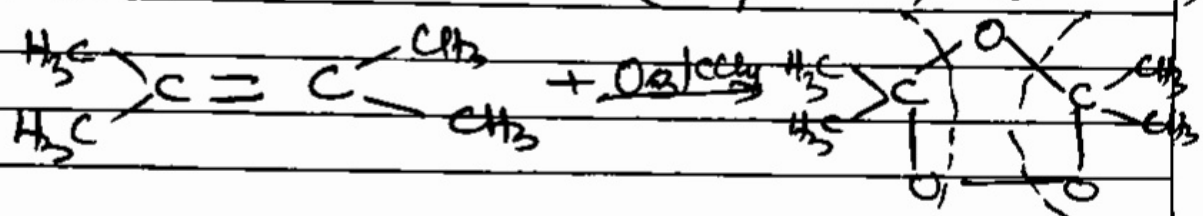
3. $CH_3-CH=CH-CH_3 \xrightarrow[CCl_4]{O_3}$  $\xrightarrow{H_2O/Zn}$ $2\,CH_3-\overset{O}{\overset{\|}{C}}-H$
(But-2-ene)

4. $CH_3-\overset{CH_3}{\overset{|}{C}}=CH_2 \xrightarrow[CCl_4]{O_3}$  $\xrightarrow[Zn]{H_2O}$ $CH_3-\overset{O}{\overset{\|}{C}}-CH_3$ + $H-\overset{O}{\overset{\|}{C}}-H$
(2-Methyl prop-1-ene) (Propanone) Methanal

By trick

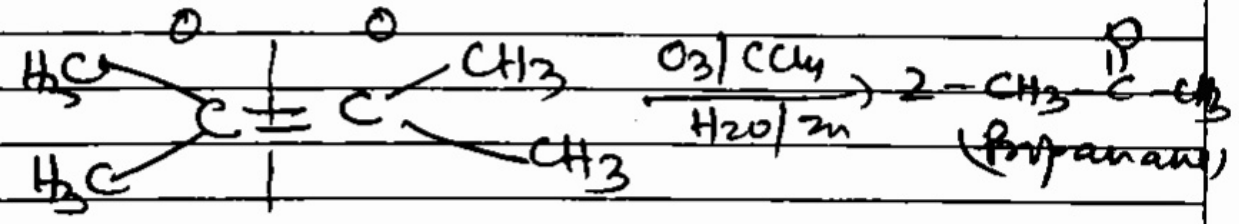




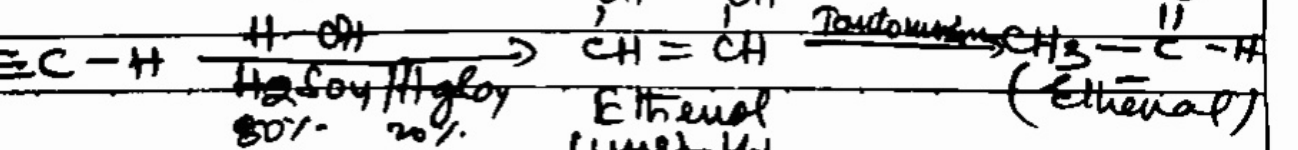
5. 

2 $CH_3-\overset{O}{\overset{\|}{C}}-CH_3$

trick



4. By alkyne: When alkyne react with 80% H_2SO_4 & 20% $HgSO_4$ in presence of 60–80°C it give aldehyde or ketone.



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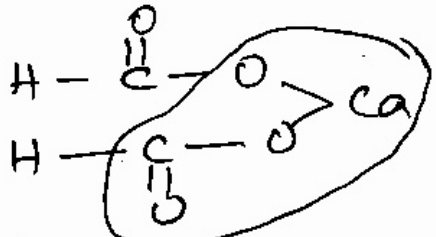
5. By dry distillation of salt of Carboxylic acid. When the salt of Ca of Carboxylic acid is heated or go for dry distillation it form aldehyde or ketone & the biproduct will be $CaCO_3$, salt we prefer made up of calcium.

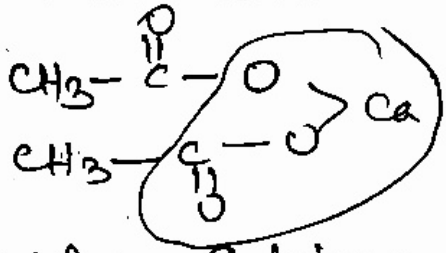
i) When Calcium-formate is heated it gives formaldehyde



$$\xrightarrow[\text{dry dist.}]{\Delta} H-\overset{O}{\overset{\|}{C}}-H + CaCO_3.$$

(formaldehyde)

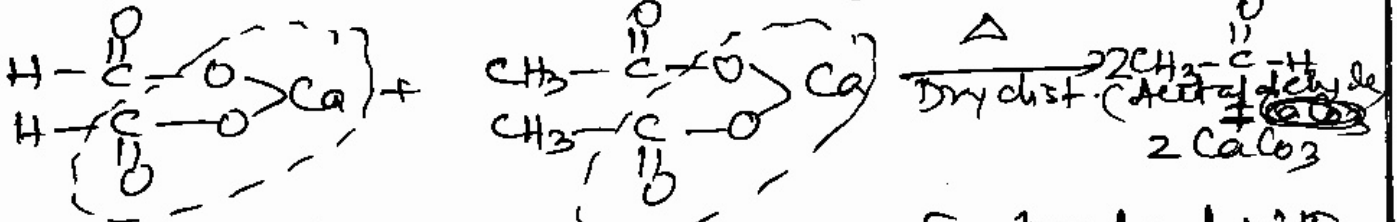
ii) When Calcium acetate is heated it gives acetone.



$$\xrightarrow[\text{dry distill.}]{\Delta} CH_3-\overset{O}{\overset{\|}{C}}-CH_3 + CaCO_3.$$

(Acetone)

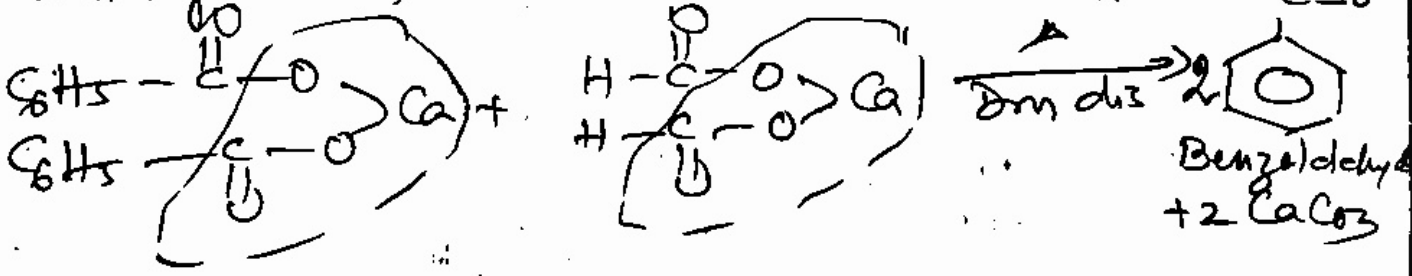
iii) When Calcium formate & Calcium acetate mixture is heated it gives acetaldehyde.



$$\xrightarrow[\text{Dry dist.}]{\Delta} 2CH_3-\overset{O}{\overset{\|}{C}}-H + 2CaCO_3$$

(Acetaldehyde)

iv) When One part of Ca benzoate is heated with mixing Ca. formate it will give benzaldehyde.



$$\xrightarrow[\text{Dry dist}]{\Delta} 2\,\text{Benzaldehyde} + 2CaCO_3$$