Dihydric Alcohols.

* Compounds containing two hydroxyl group attached to different carbon atom of their molecules.

General Formula - $(CH_2)_n(OH)_2$

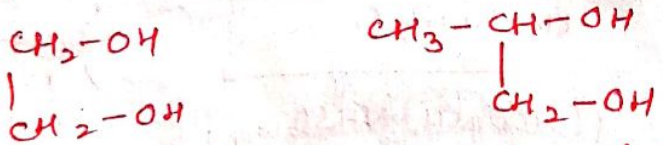
where n = 2, 3, 4, ...

* Comonly known as Glycals. because of sweet taste

- α- Glycol - 1,2 glycol. (Vicinal Glycol).
- β- Glycol - 1,3 glycol.
- ω- glycol → OH attached at terminal groups.

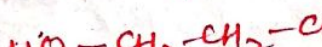
Nomenclature :

(i) Common system. - α- glycols are named by adding the word glycol to name the alkene from which they can be prepared by direct hydroxylation.



Ethylene Glycol. Propylene glycol.

→ In contrast β, γ, ... ω glycols named as corrosponding polymethylene glycols



Trimethylene glycol (1- β- glycol.

Pentamethylene glycol (1 ω-glycol).

(ii) IUPAC System. → In this system dihydric alcohols are named diols. Their names will be obtained by adding diol to the name of corrosponding alkane.

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$HO-CH_2-CH_2-OH$
Ethane-1,2-diol.

$CH_3-CH(OH)-CH_2(OH)$
Propane-1,2-diol.

$CH_2(OH)-CH_2-CH_2(OH)$
Propane-1,3-diol.

Methods of Formation of Vicinal Glycols:

(Vicinal Glycols = 1, 2 glycols)

1) Hydroxylation of Alkenes:

* [Cold & dilute (1%) Aqueous alkaline solution of potassium permanganate]

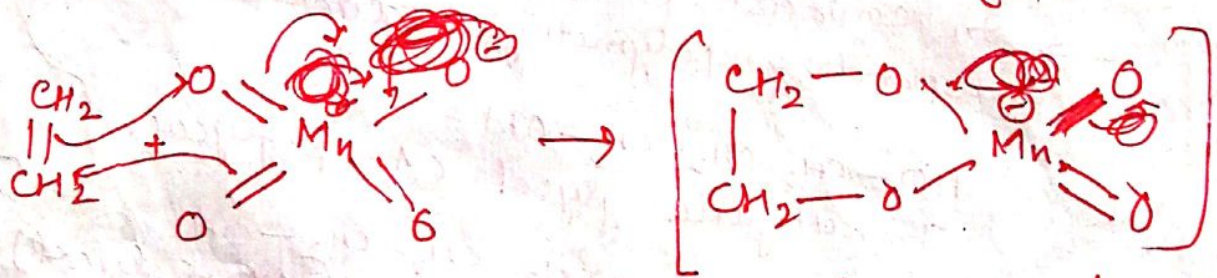
↓

Bayer's Reagent:

* This reaction can also be proceed through R^n with ($OsO_4 + H_3O^+$) ($H_2O + Na_2SO_3$ or $NaHSO_3$)

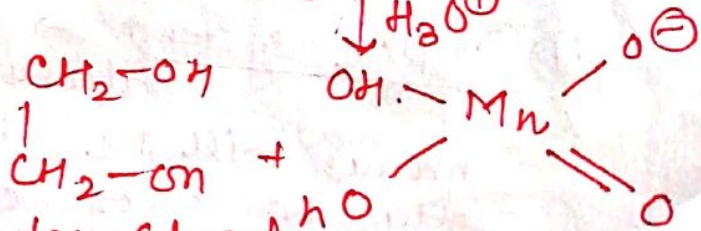
$$>C=C< \xrightarrow[\text{(ii) } NaHSO_3(aq)]{KMnO_4/H_2O} >C(OH)-C(OH)<$$

Glycol.



Cyclic Manganate ester

$\xrightarrow{H_3O^{\oplus}}$



Ethylene Glycol.

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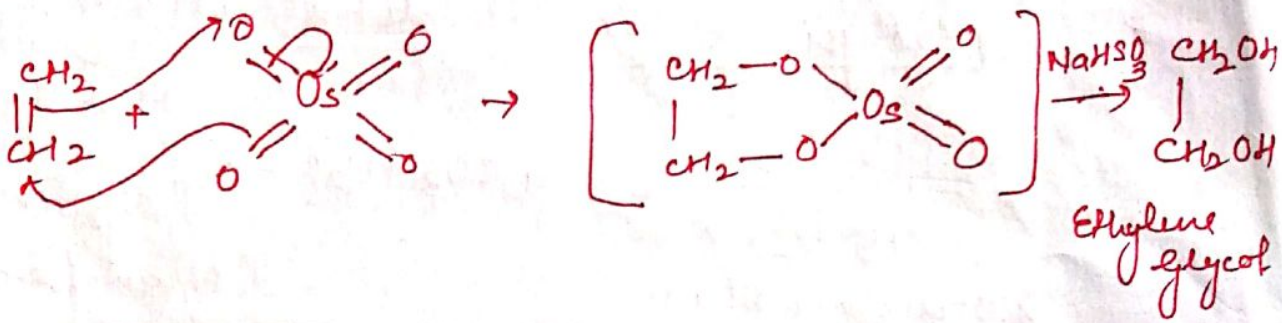
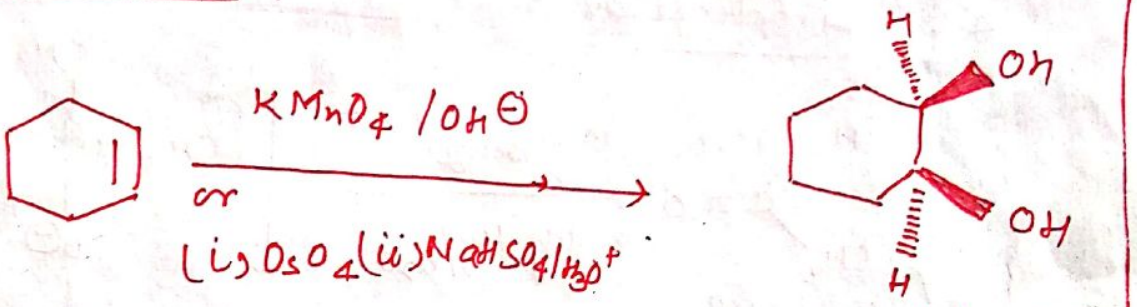


Stereochemistry

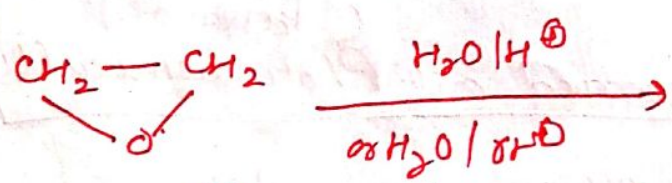


Cyclohexene.

Cis-1,2-cyclohexane diol.

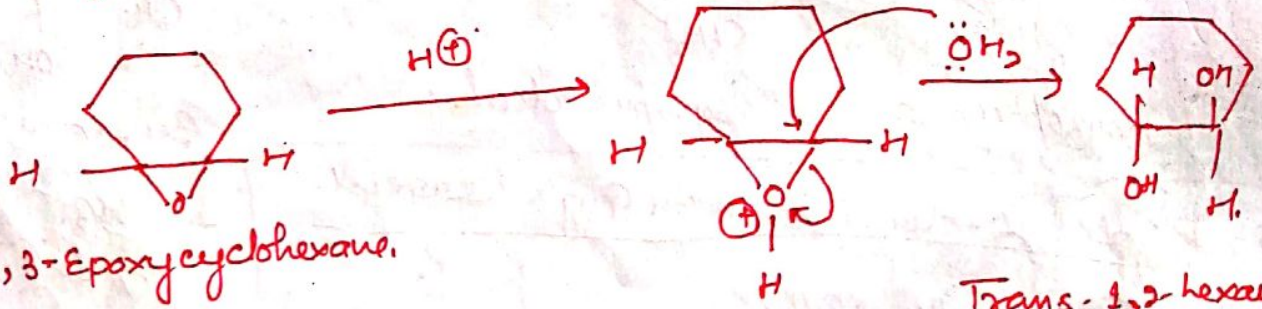
(Syn-hydroxylation process).

2- By hydroxylation of Epoxides:



Ethylene epoxide.

Ethylene Glycol.



1,3-Epoxycyclohexane.

Trans-1,2-hexane diol.

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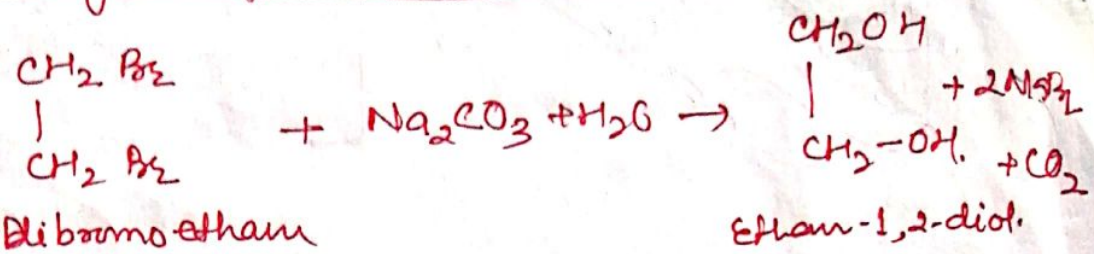
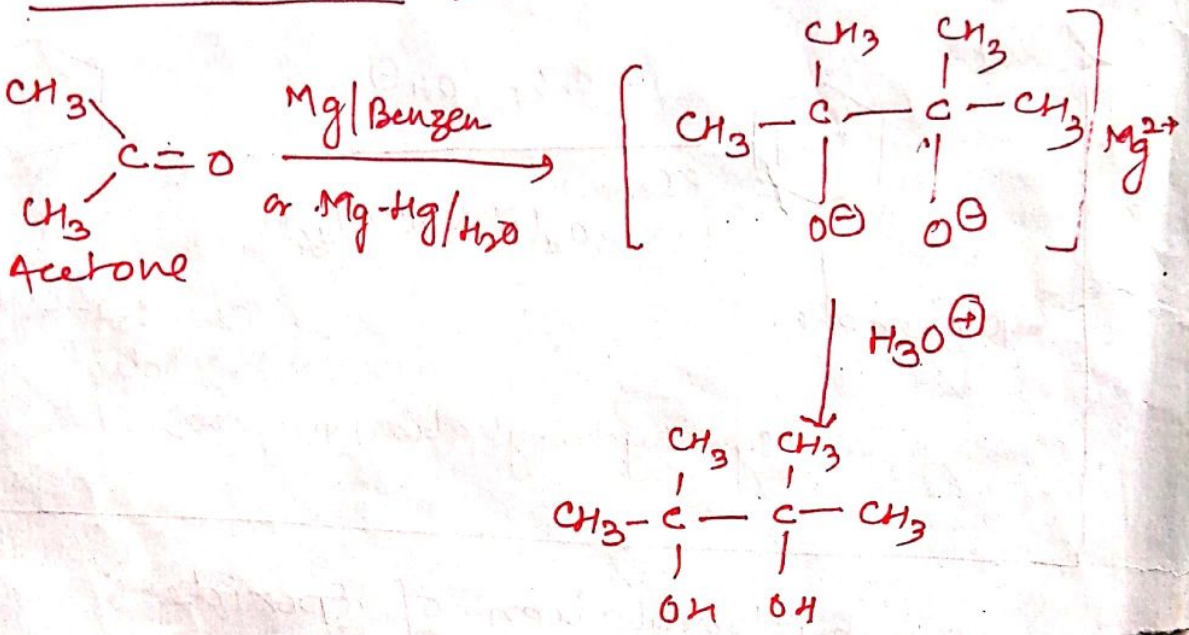
3. Hydrolysis of vicinal dihaloalkanes.



1,2-Dibromoethane

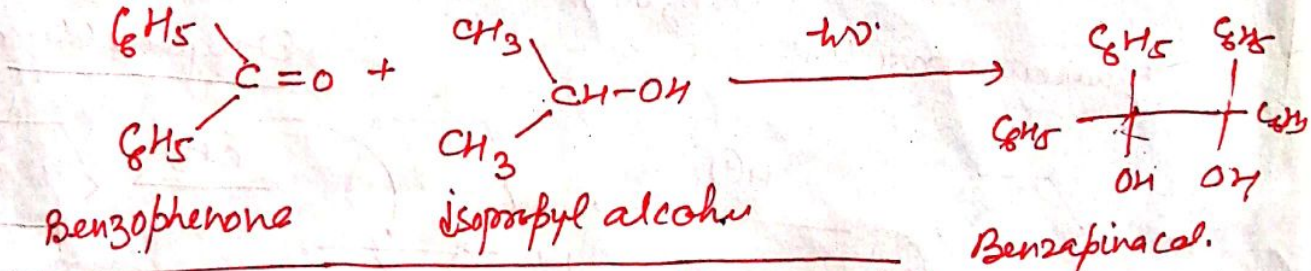
Ethan-1,2-diol.

4 - Bimolecular R^n of Carbonyl compounds:



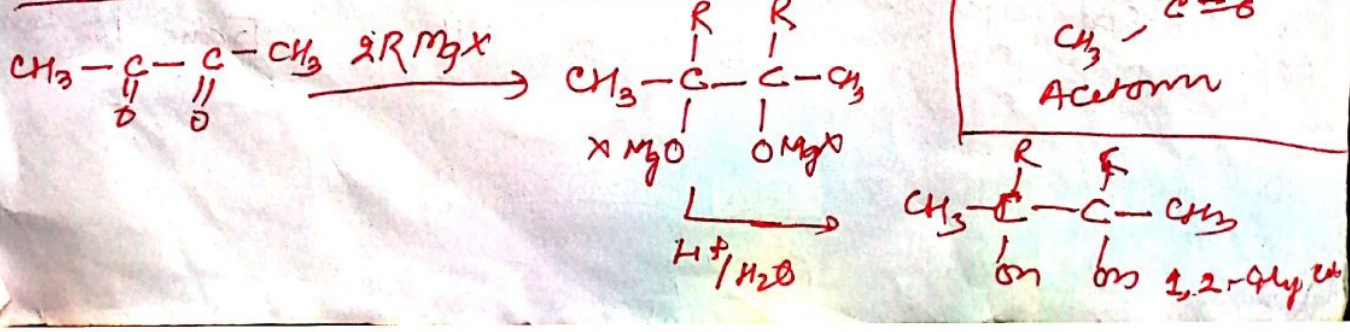
2, 3-Dimethylbutane-2,3-diol
(Pinacol)

Red^n may be carried out Photochemically.



Benzapinacol.

5- R^n of 1-2-diketones with Grig's Reagent-



1,2-Diol

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Physical Properties:

CH_2-OH
CH_2-OH.

1. Colourless, viscous liquid, sweet in taste
2. High viscosity because of two sites for intermolecular hydrogen bonding.
3. ~~Soluble~~ Ethan 1,2-diol is highly soluble in water due to two sites for Hydrogen bonding with water.
4. ~~Br~~ Boiling Point is quite high (470K). because of hydrogen bonding.

Chemical Reaction:

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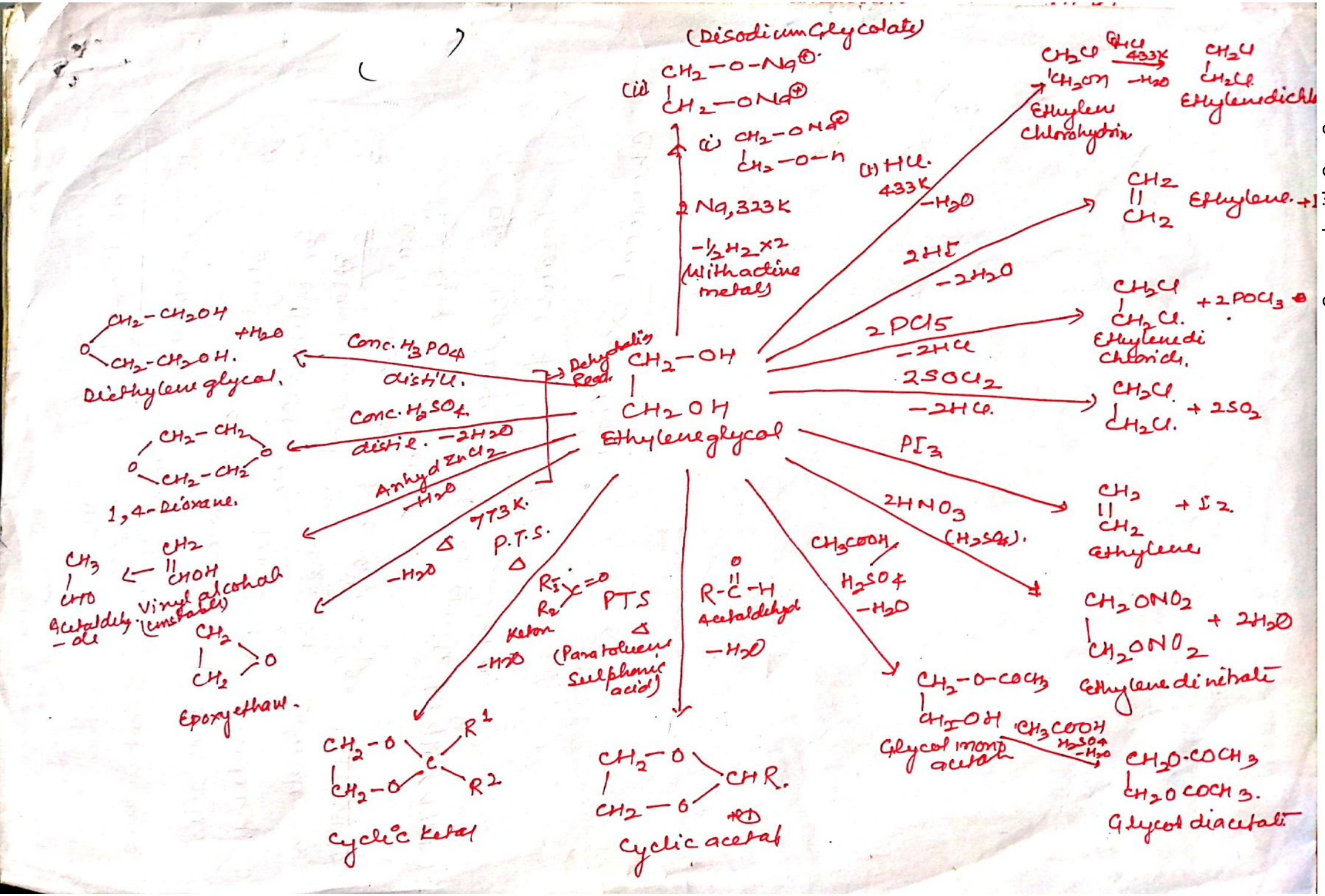

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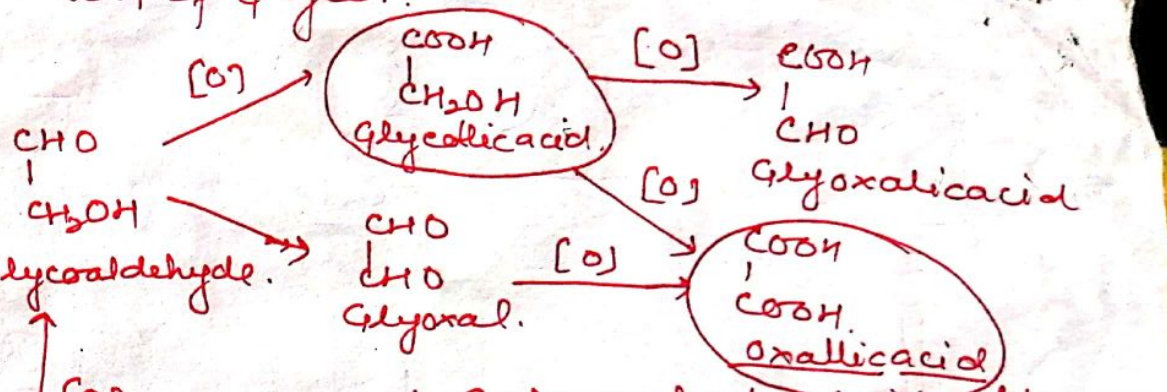
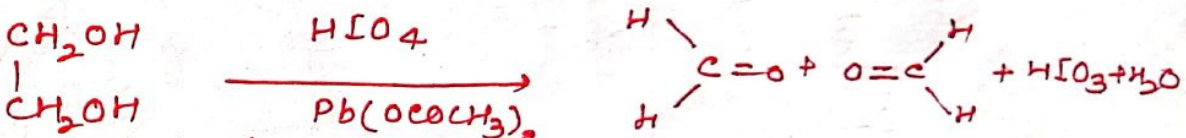
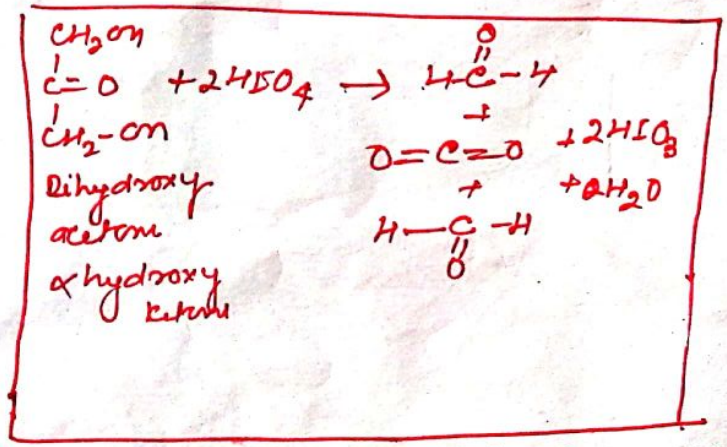
Oxidation of Glycol.



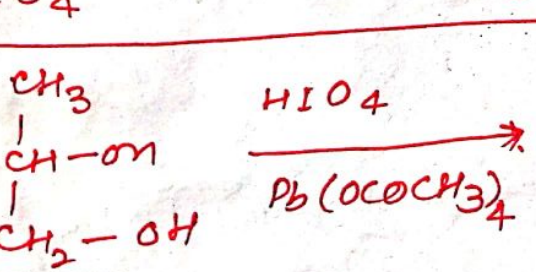
* Carbon carbon bond will not break when oxidise with Conc. HNO_3

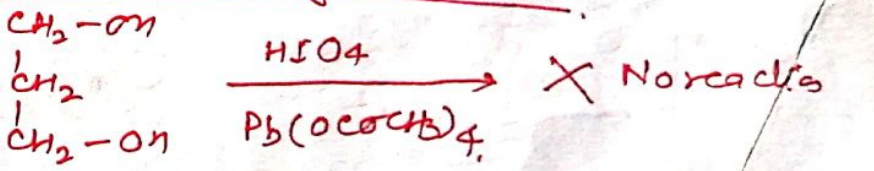


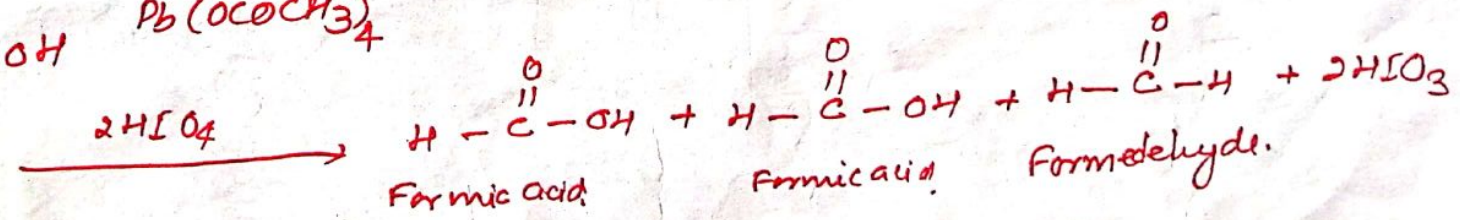
* Oxidation of 1-2 glycols with periodic acid to give carbonyl compounds is also called **Malaprade Reaction**



* HIO_4 & $Pb(OCOCH_3)_4$ are specific for 1,2-Glycol spliting.







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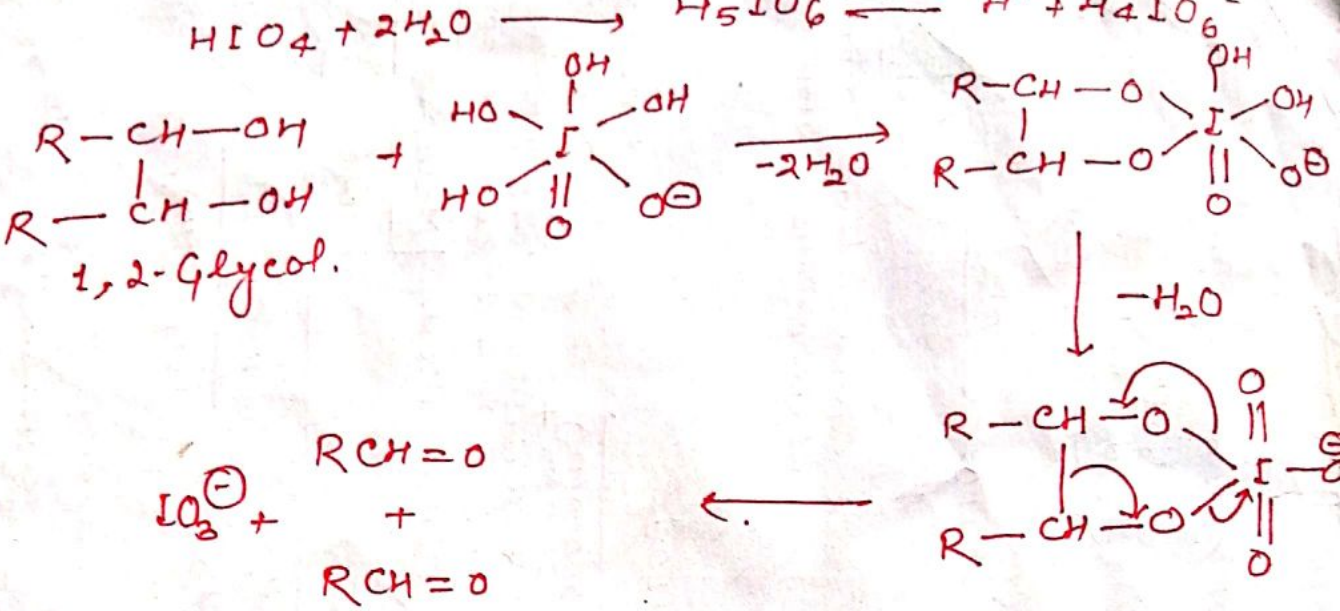
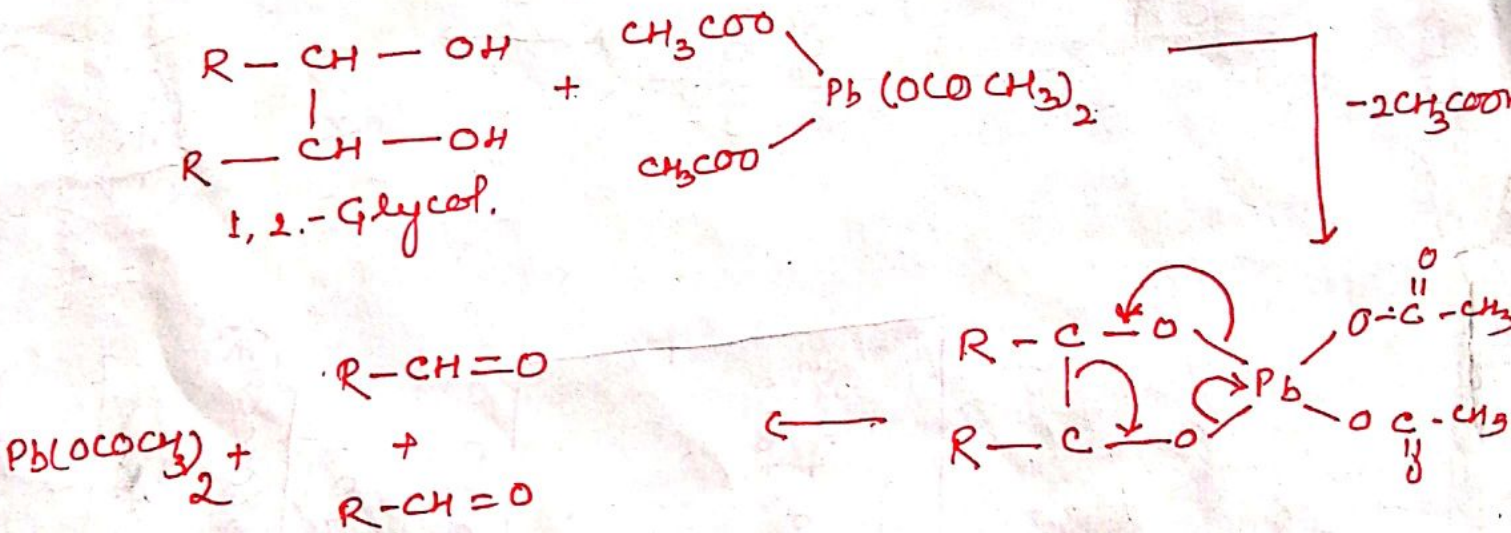
Mechanism: (HIO_4)



Mechanism: