① Discuss the two major classification of Alkanols. Give two examples each for each class.

There are two major classifications of alkanol which are as follows:

① Classification based on the number of alkyl group or hydrogen atom.

Note: Alkanol has the general molecular formula "R–OH" where "R" is the alkyl group e.g

Methyl – CH_3-

Ethyl – CH_3CH_2-

Propyl – $CH_3CH_2CH_2-$ etc.

While "–OH" is the hydroxyl group which is the main functional group for alkanols.

Therefore based on this classification, alkanols can be classified as follows:

i Primary alkanol: Primary alkanols have only one alkyl group or three or two hydrogen atom attached to the carbon atom that carries hydroxyl group.

eg

(a) $CH_3-\underset{\displaystyle H}{\overset{\displaystyle H}{\underset{|}{\overset{|}{C}}}}-OH$ Ethanol (1°)

(b) CH_3OH or $H-\underset{\displaystyle H}{\overset{\displaystyle H}{\underset{|}{\overset{|}{C}}}}-OH$ Methanol (1°)

ii Secondary alkanol: Secondary alkanols have two alkyl groups or one hydrogen atom attached to the carbon that

Carries the hydroxyl group

e.g

(a) $CH_3-\underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$

Propan-2-ol (2°)
or
2-Propanol (2°)

(b) $CH_3-CH_2-\underset{\underset{H}{|}}{\overset{\overset{OH}{|}}{CH}}-CH_3$

2-Butanol (2°)
or
2-Butan-2-ol (2°)

iii Tertiary alkanol: Tertiary alkanols have three alkyl groups and no hydrogen atom attached to the carbon atom that carries the hydroxyl group (-OH)

e.g

(a) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$

2-Methyl propan-2-ol (3°)
or
2-Methyl-2-propanol (3°)

(b) $CH_3-CH_2-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}}-CH_3$

2-Methyl Butan-2-ol
or
2-Methyl-2-Butanol

2 Classification based one the number of hydroxyl groups they possess.

Note: The hydroxyl group has a general formula "-OH". Therefore based on this classification, alkanols can be classified as follows:

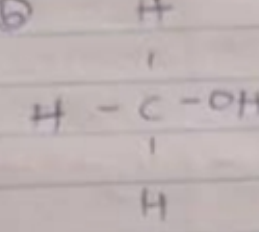
i Monohydric alkanols: Monohydric alkanols have only one hydroxylic group (-OH) present in the alkanol structure

e.g.

(a) $CH_3CH_2CH_2OH$ or $CH_3-CH_2-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-OH$

propanol (Monohydric alkanol)

⑥



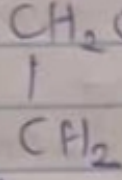
Ethanol (Monohydric alkanol)

ii Dihydric alkanols: Dihydric alkanol are also called Glycols have two hydroxyl group present in the alkanol groups present in the alkanol structure.

eg

$CH_3CH(OH)CH_2CH(OH)CH_2CH_3$

Hexane-2,4-diol (Dihydric alkanol)

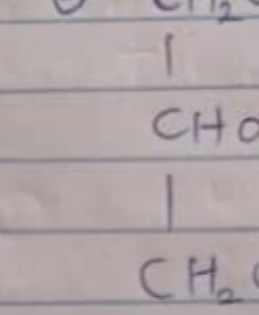


Ethane-1,2-diol (Dihydric alkanols.

iii Trihydric alkanol: Trihydric alkanol or triols are alkanols that have three hydroxyl groups present in the alkanol structure.

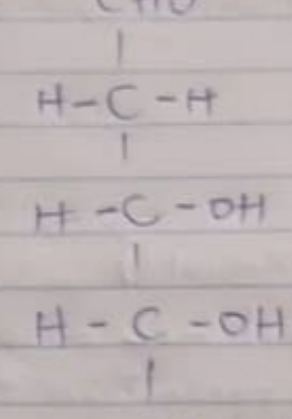
eg

⑤



Propane-1,2,3-triol (Trihydric alkanol)

(b)



D-glyceral dehyde

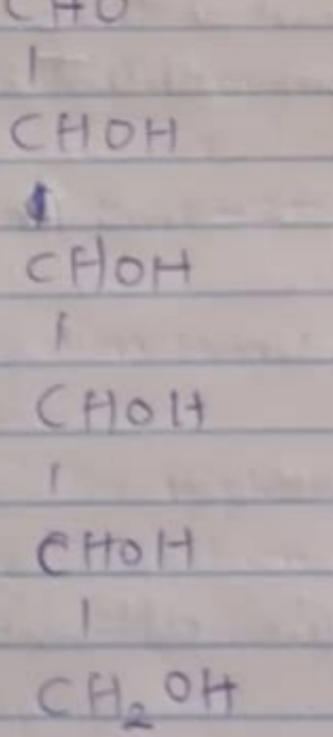
14 Polyhydric alkanols: Polyhydric alkanols or polyols are those alkanols having more than three hydroxyl groups in the alcohol structure

e.g

(a) $CH_3CH(OH)CH(OH)CH(OH)CH(OH)CH(OH)CH_3$

Heptane-2,3,45,6-pentand (Polyhydric alkanol)

(b)



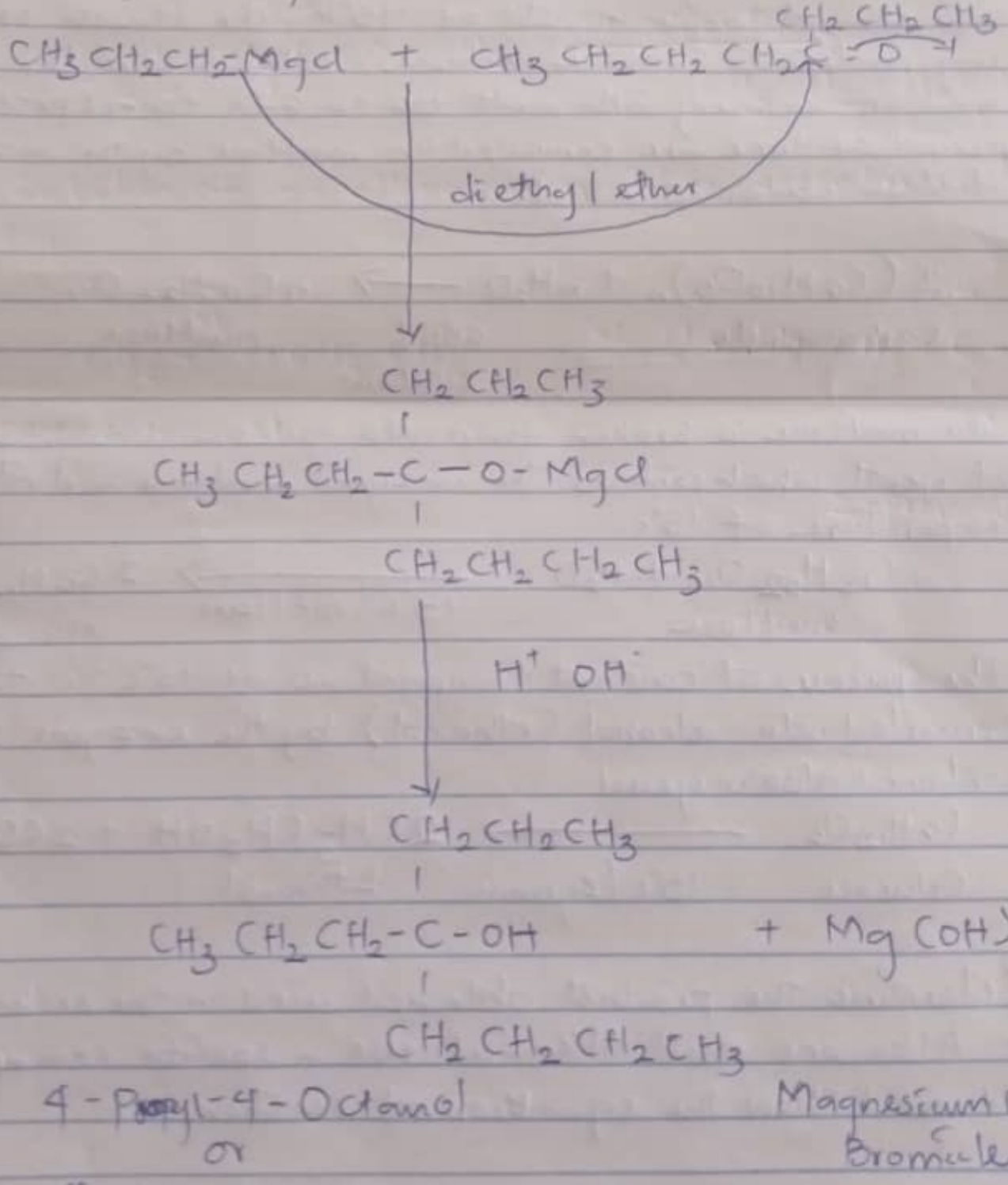
L-(-)-Talose

2 In the Grignard synthesis of alkanols, reaction of Grignard reagent with $CH_3CH_2CH_2CH_2C{=}OCH_2CH_2CH_3$. $CH_3CH_2CH_2$ Show the reaction steps.

$CH_3CH_2CH_2MgCl$ + $CH_3CH_2CH_2CH_2C{=}OCH_2CH_2$

Propyl Magnesiumchloride (Grignard reagent)

4-Octanone
Octan-4-one



4-Propyl-4-Octanol
or
4-Propyl Octan-4-ol

Magnesium hydroxy Bromide