

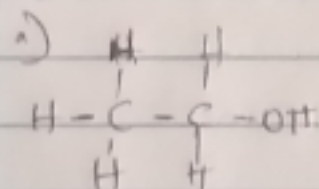
D) Discuss the two major classifications of Alkanols  
Give two examples for each class

A) Classification based on alkyl group or hydrogen atom

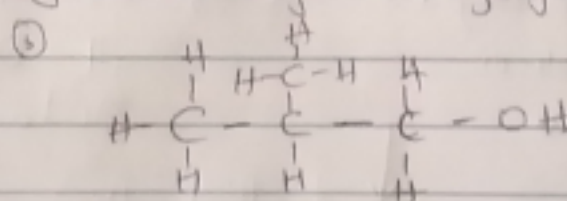
The classification is done in accordance to where the carbon atom of an alkyl group is attached to the hydroxyl group. Most of the alcohols are said to be colourless liquids or even said to behave as solid at room temperature.

Therefore based on this classification alkanols can be classified as follows.

i) Primary alkanols: These are those alkanols where the carbon atom of the hydroxyl group (OH) is attached to only one single alkyl group.

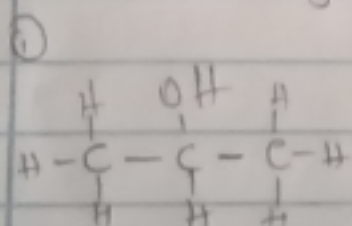


Ethanol

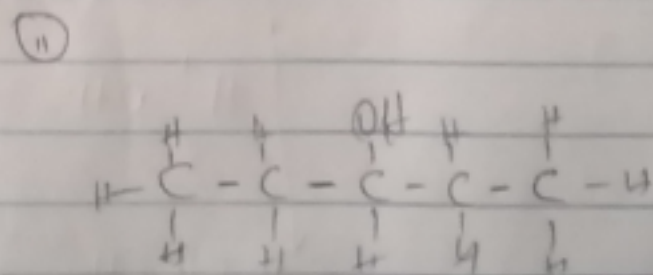


2-methylpropano-1-ol

II) Secondary alcohols: These are those alkanols where the carbon atom of the hydroxyl group (OH) is attached to two alkyl groups on either side



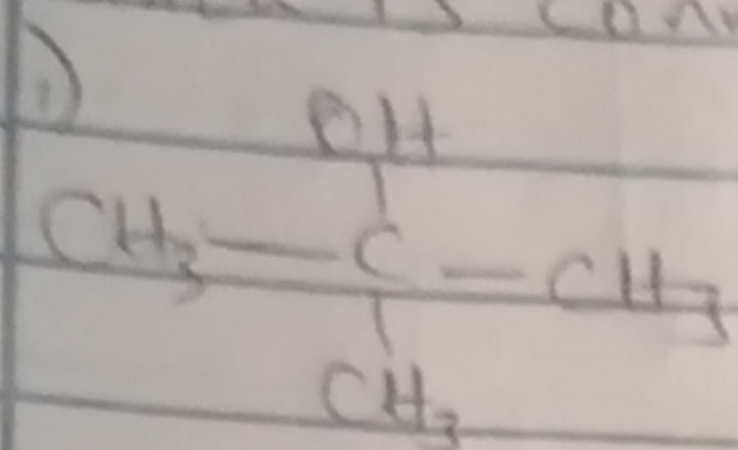
Propan-2-ol



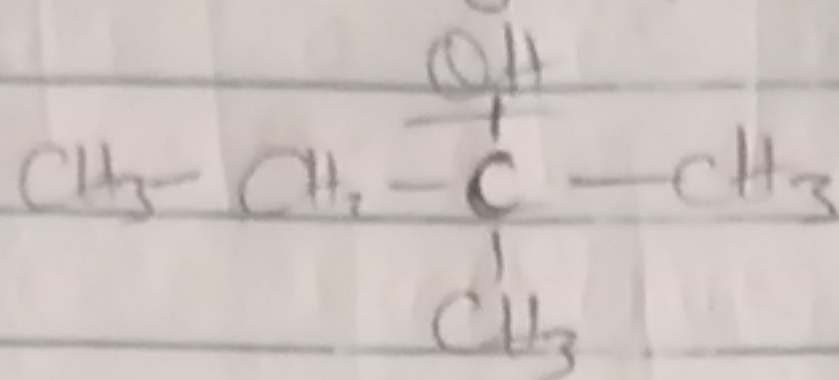
Pentan-3-ol



III) Tertiary Alcohols: These are those alcohols which feature hydroxyl group attached to the carbon atom which is connected to 3 alkyl group



(ii)



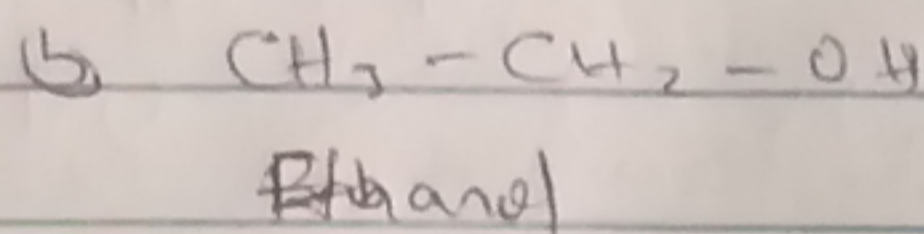
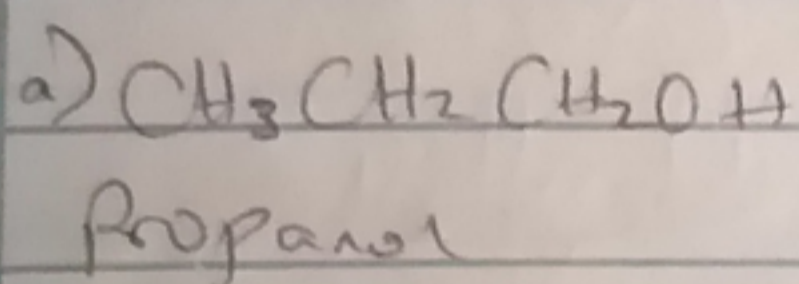
2-methylpropan-2-ol

2-methylbutan-2-ol

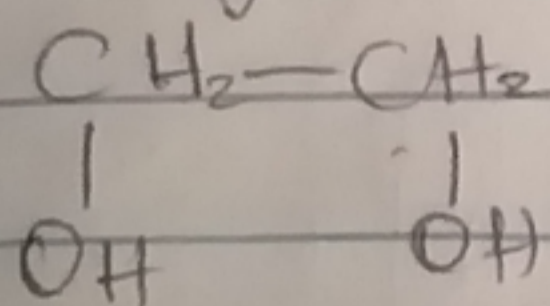
B) Classification based on the number of hydroxyl group they possess

Based on this classification, alcohols can be classified as follows

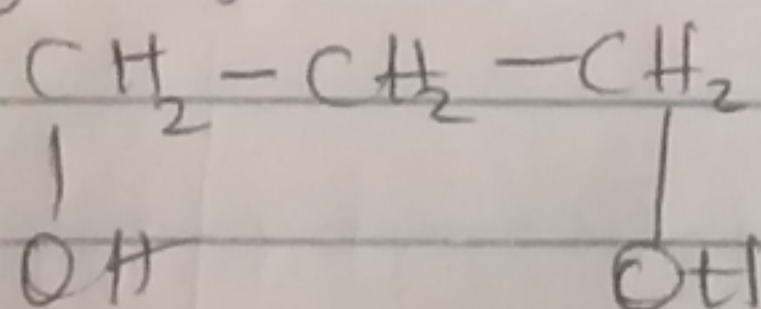
i) Monohydric alcohols: Monohydric alcohols have only one hydroxylic group (-OH) present in the alcohol structure e.g.



2) Dihydric alcohol: These are alcohols containing two hydroxyl (-OH) groups are known as



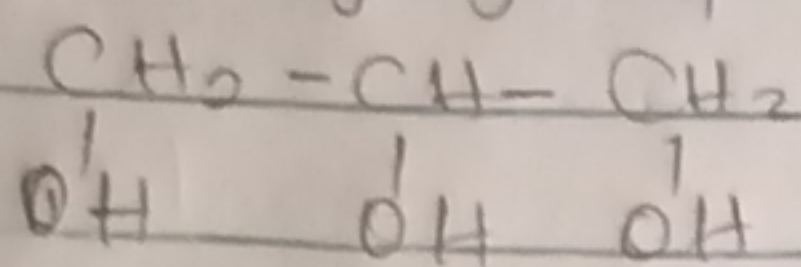
1,2 Ethandiol



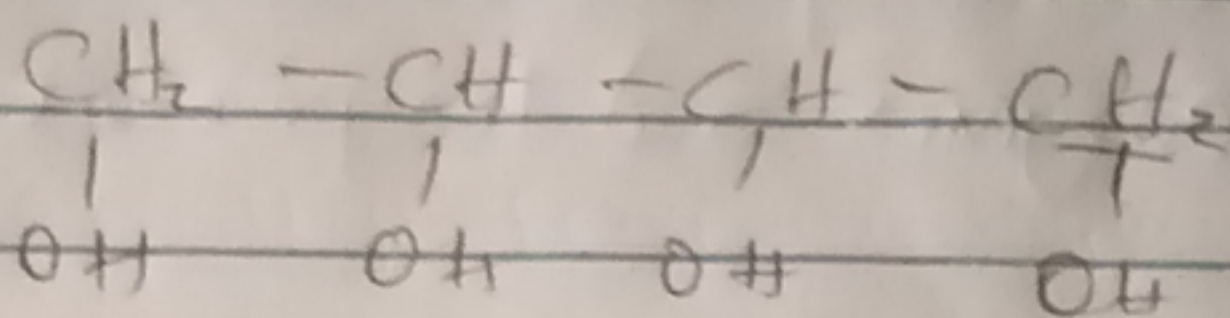
1,3-Propanediol



14) Trihydroxy alcohols - These only contain three hydroxyl groups ~~known~~

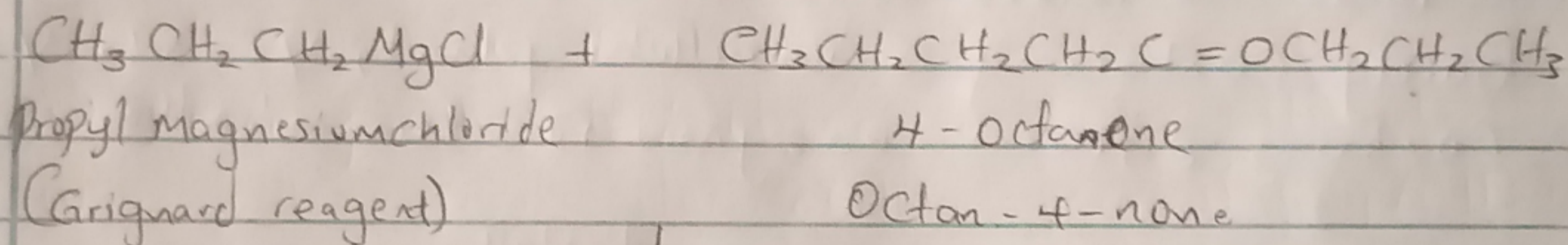


1,2,3 - Propanetriol

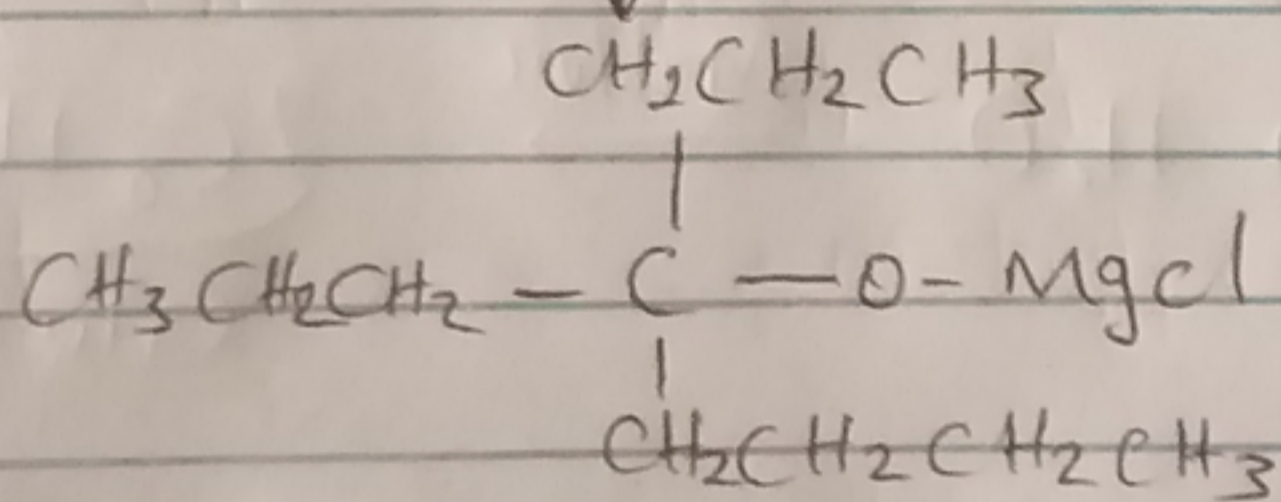


1,2,3 - Butanetriol

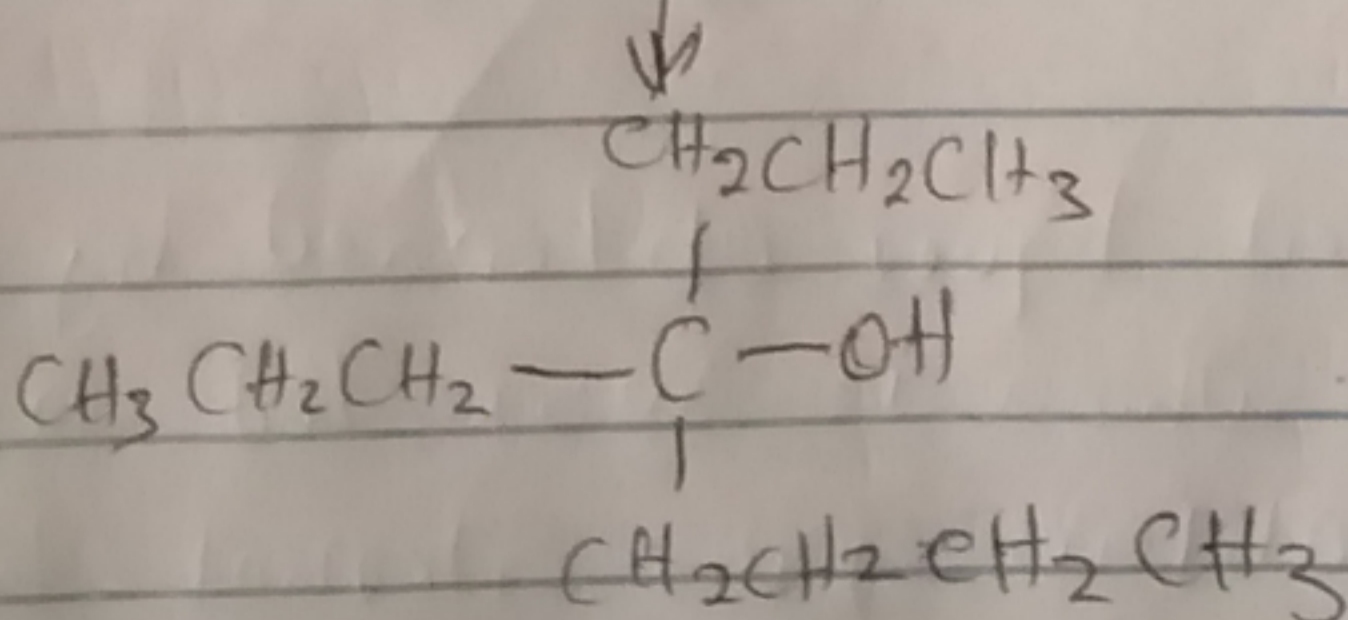
2) In the Grignard synthesis of alcohol, react a named Grignard reagent with  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$ . Show the reaction steps.



diethyl ether



$\text{H}^+ \text{OH}^-$



4-propyloctan-4-ol

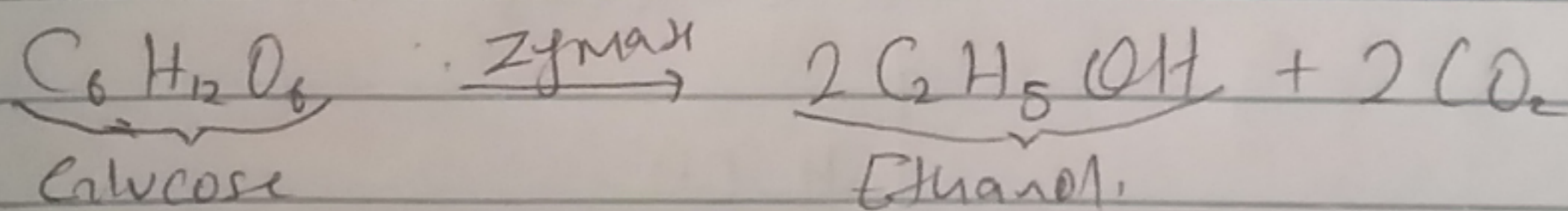
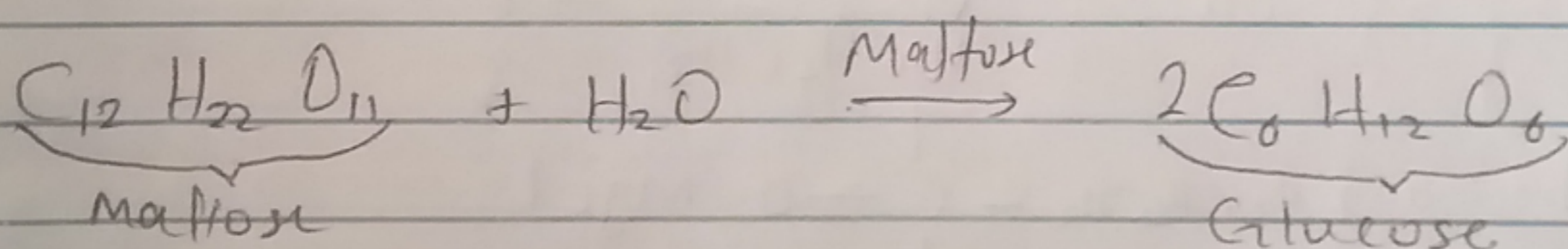
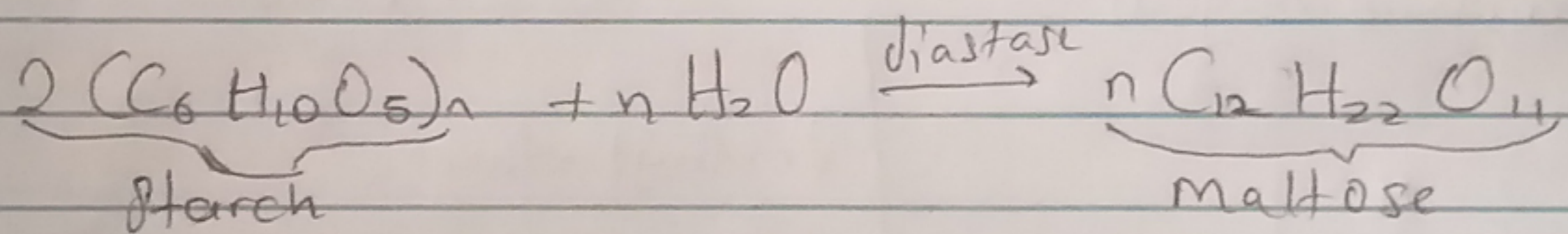
+  $\text{Mg}(\text{OH})\text{Br}$   
Magnesium Hydroxyl  
Bromide



3) Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction.

Ethanol is also manufactured from starch containing food grains like millet, rice, wheat, maize etc. In this method, food grains are cooked at first to release starch granules. The solution is diluted with water and the resulting solution is called 'mash'.

'mash' is mixed with water malt which is germinated barley containing a unicellular plant, yeast. Yeast contains different enzymes for fermentation.



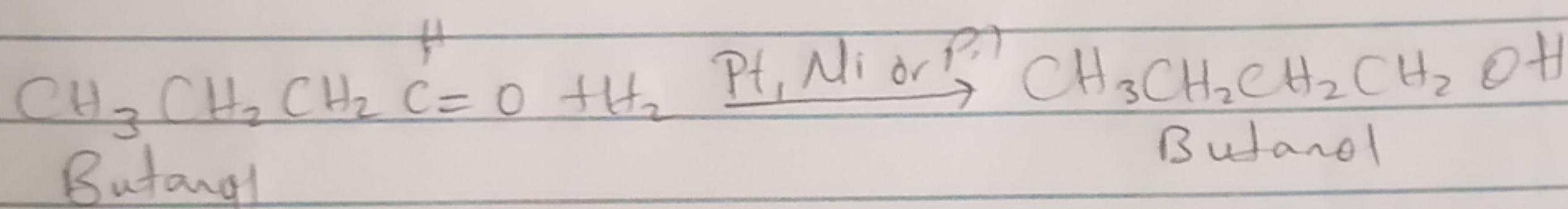
The fermented liquor obtained by this method is called 'wash' which is subjected to fractional distillation to obtain pure alcohol having the purity of about 90-97% and is called 'rectified spirit'.



4) Determine the product obtained in the reduction of Alkanone and Alkanal use a specific example for each and show the equation of reaction.

Alkanals and Alkanones are reduced to primary and secondary alkanol by hydrogenation of carbon-oxygen ~~or~~ double bond in the presence of a catalyst such as Platinum (Pt), Nickel (Ni), Palladium (Pd) or with Sodium tetrahydroborate (III) ( $\text{NaBH}_4$ ).

Example: Reduction of alkanal yield an alkanol is reduced to primary alkanols e.g.



2) Reduction of an alkanone yield a secondary alkanol e.g.

