

19/ENG05/017

" Alcohol are very important organic compounds. Discuss briefly their classification and give one example each.

Answer.

i. Classification based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group.

- If the number of hydrogen atom attached to the carbon atom is two or three, it is called a PRIMARY ALCOHOL (1°)
- If the number of hydrogen atom attached to the carbon atom is one, it is called a SECONDARY ALCOHOL (2°)
- If the number of hydrogen atom attached to the carbon atom having the hydroxyl group is zero, it is called a TERTIARY ALCOHOL (3°)

Example:

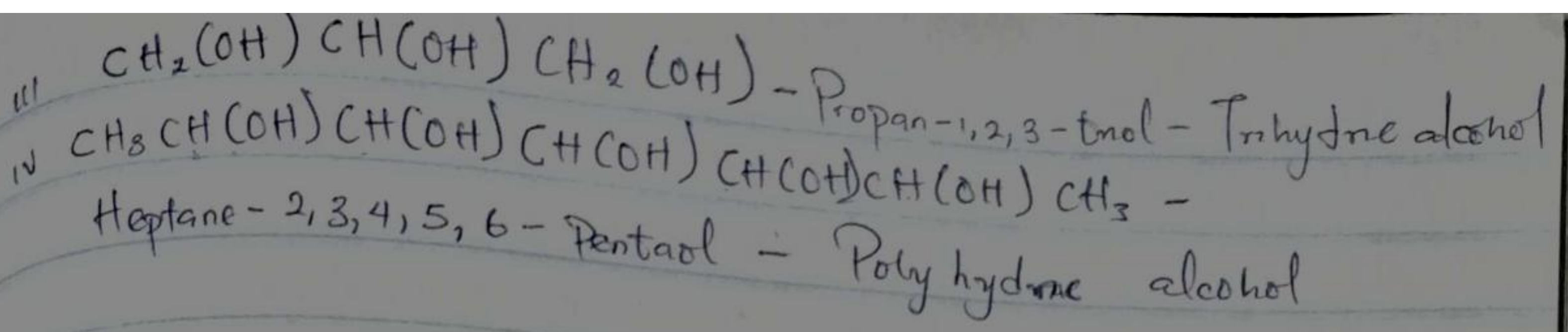
- i. $\text{CH}_3\text{CH}_2\text{OH}$ - Ethanol - Primary Alcohol
- ii. $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ - Propan-2-ol - Secondary Alcohol
- iii. $(\text{CH}_3)_3\text{COH}$ - 2-methyl Propan-2-ol - Tertiary Alcohol

ii. Classification based on the number of hydroxyl groups they possess

- Monohydric alcohols have one hydroxyl group present in the alcohol structure
- Dihydric alcohols are also called Glycols, have two hydroxyl groups present in the alcohol structure.
- Trihydric alcohols are also called Triols, have three hydroxyl groups present in the alcohol structure
- Polyhydric alcohols or polyols have more than three hydroxyl group present in the alcohol structure

Example

- i. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ - Propanol - Monohydric alcohol
- ii. $\text{CH}_2(\text{OH})\text{CH}_2(\text{OH})$ - Ethane-1,2-diol - Dihydric alcohol

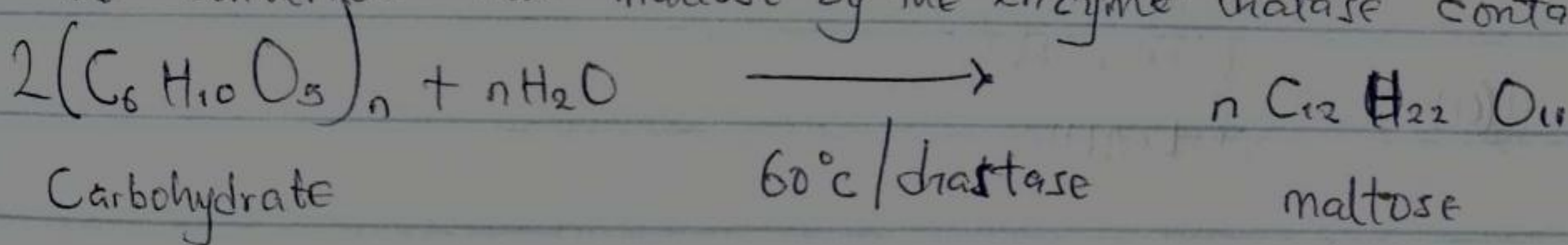


2. Discuss the solubility of alcohols in water, organic solvents
 Solubility of alcohol in water, in organic solvent. The solubility of lower alcohols with up to three carbons in their molecule are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decrease with increasing relative molecular mass.

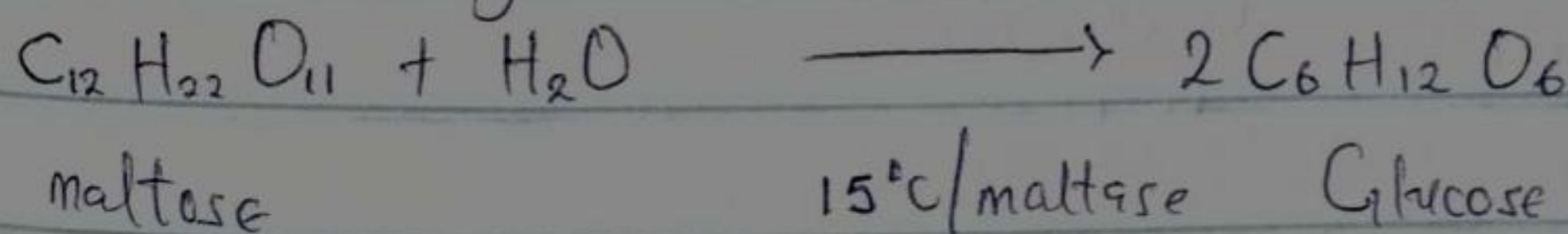
In Organic solvent, all monohydric alcohols are soluble. The solubility of simple alcohol and polyhydric alcohol is largely due to their ability to form hydrogen bonds with water molecules.

3. Show the three steps in the industrial manufacture of ethanol. Equations of reaction are mandatory.

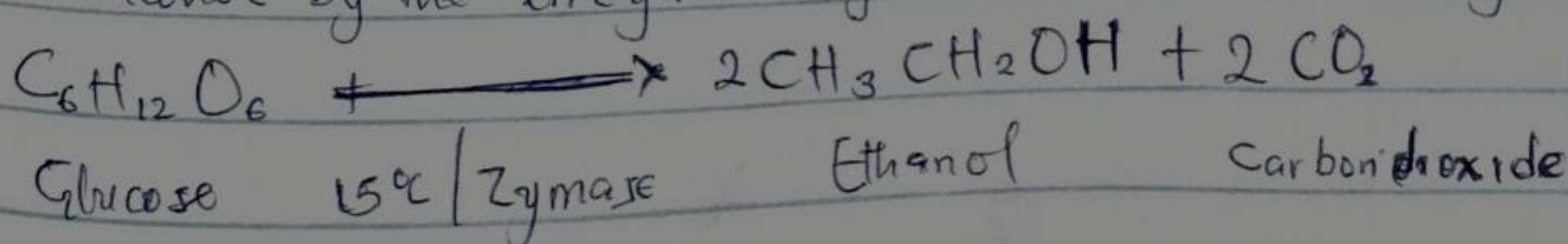
Step 1: The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



Step 2: The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C

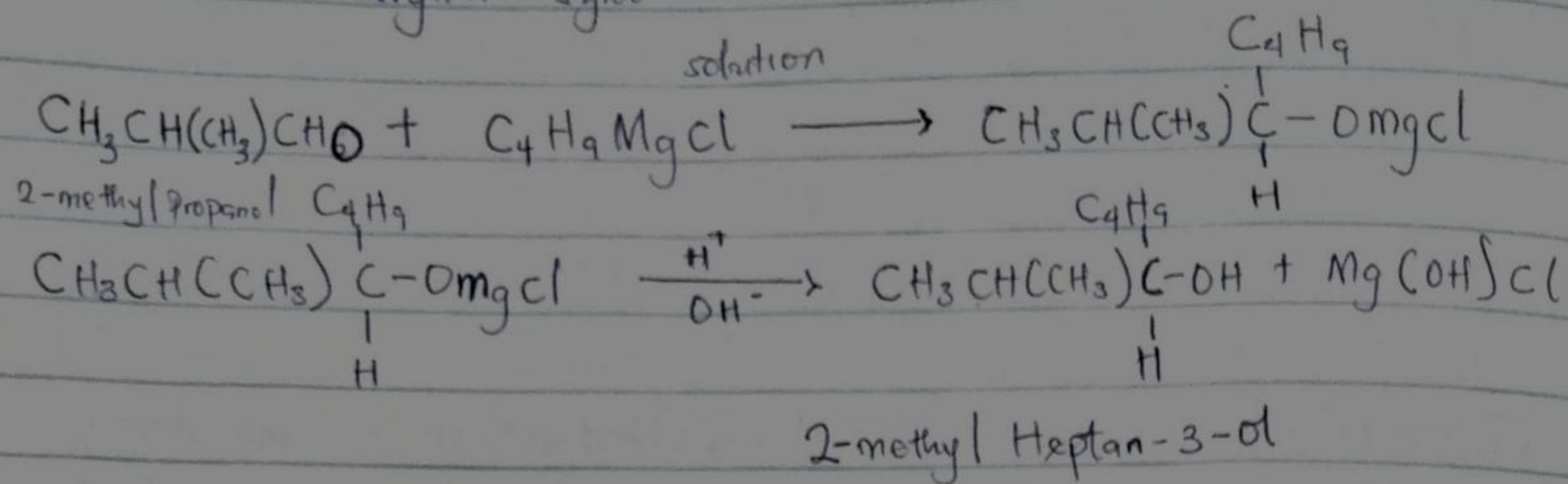


Step 3: The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast

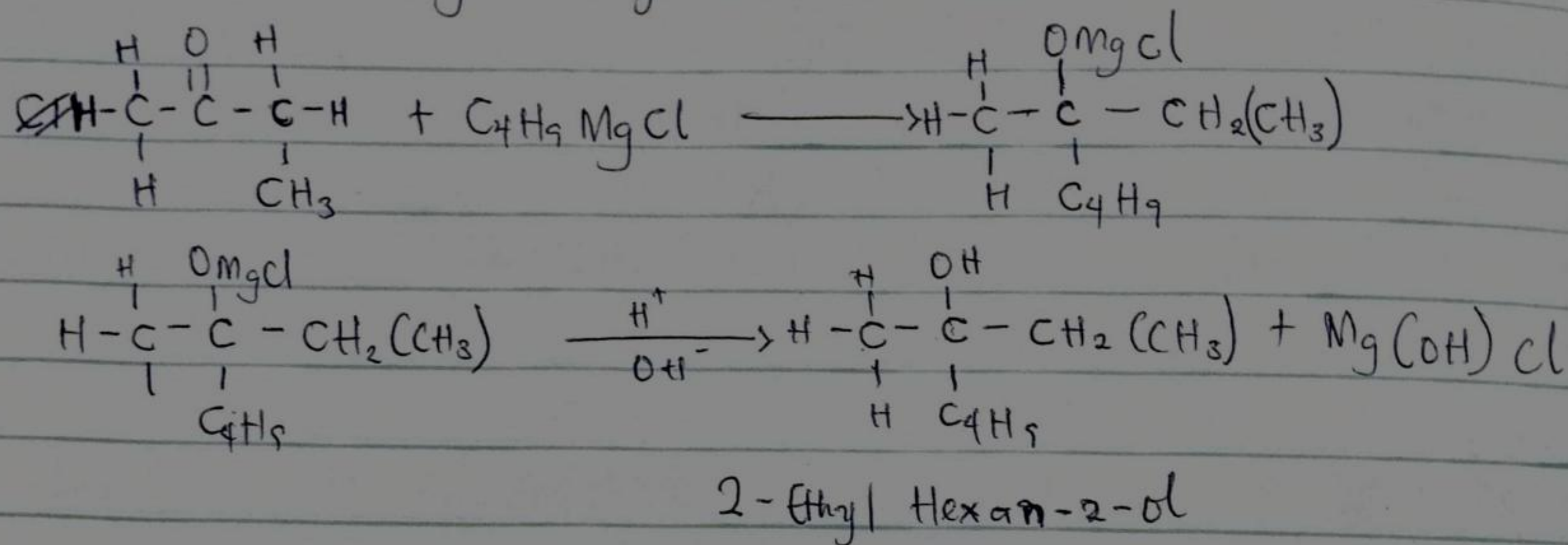


4 Show the reaction between 2-methyl propanal and butylmagnesium chloride.

Hint: Grignard Synthesis.

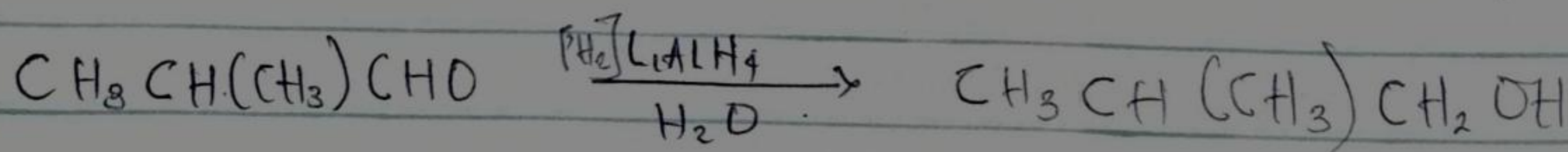


5 Show the reaction between ~~2~~ methyl propanone and butylmagnesium chloride. Hint: Grignard Synthesis. NOTE: Show all structures.



6 Show the reduction reaction of methyl propanone
 $\text{CH}_3\text{COCH}_2(\text{CH}_3)$ $\xrightarrow[\text{or LiAlH}_4]{\text{H}_2/\text{Ni or Pt cat}}$ $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2(\text{CH}_3)$

7) Show the reduction reaction of 2-methyl propanal



8) Propose a scheme for the conversion of propan-1-ol to propan-2-ol

