

Assignment:

1) Classification of Alcohols:

i. This is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are 3 or 2, it is called Primary alcohol ( $1^\circ$ ). If ~~the~~ it is one hydrogen atom, it is called Secondary alcohol ( $2^\circ$ ) and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a Tertiary alcohol ( $3^\circ$ ). Examples include:  $\text{CH}_3\text{OH}$  Methanol ( $1^\circ$ ),  $\text{CH}_3(\text{CH}_2\text{OH})\text{CH}_3$  Propan-2-ol ( $2^\circ$ ).

ii. This is based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in its structure, Dihydric alcohols (Glycols) have two hydroxyl groups present in its structure, Trihydric alcohols (Triols) have three hydroxyl group present in its structures and Polyhydric alcohols (Polyols) have more than three hydroxyl groups. Examples are  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  propanol (Monohydric alcohols),  $\text{HOCH}_2\text{CH}_2\text{OH}$  Ethane-1,2-diol (Dihydric alcohols).

2) Solubility of Alcohols:

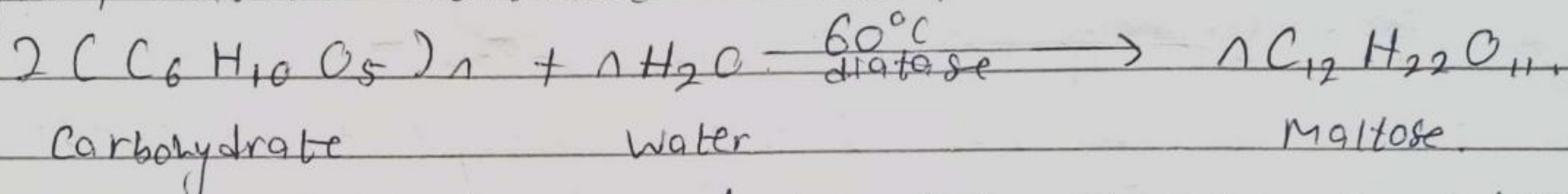
In Water: Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.

In organic solvents: All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with water molecules.

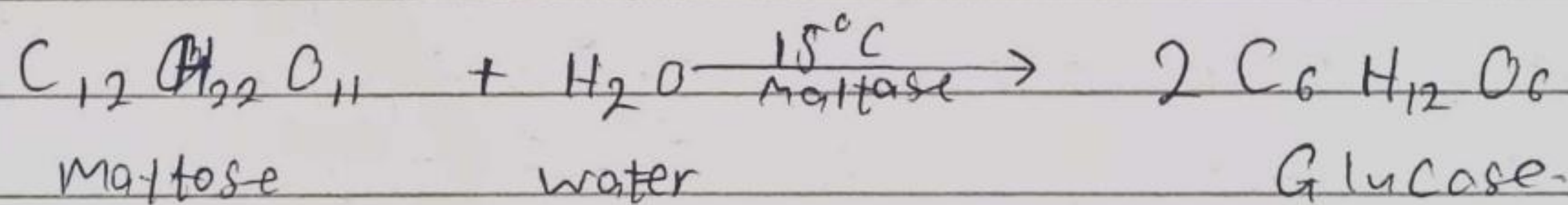


### 3. Industrial Manufacture of Ethanol.

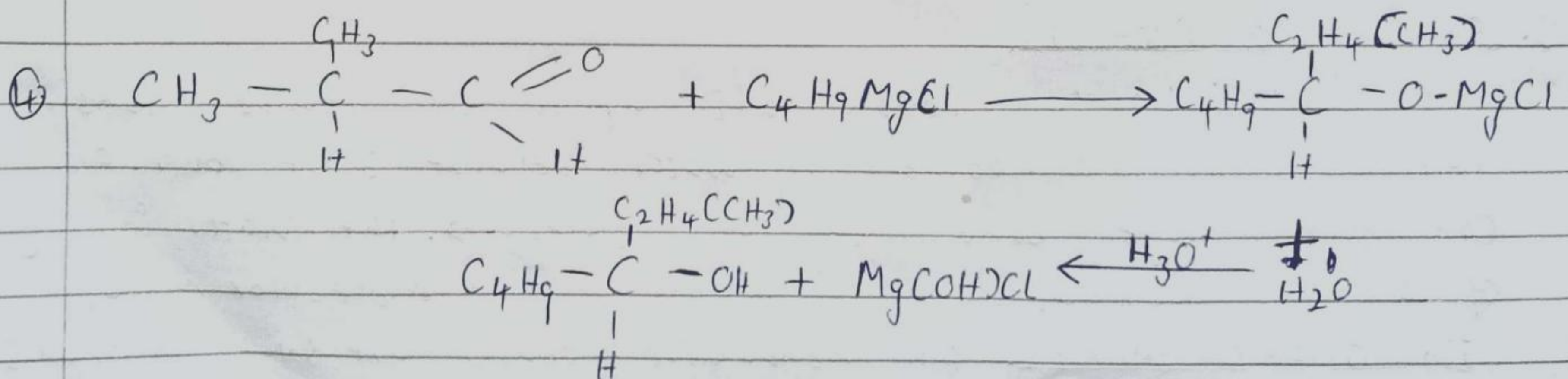
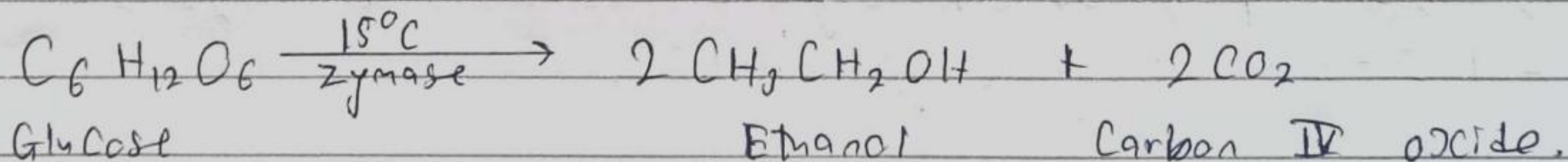
Carbohydrates such as starch are major groups of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes, found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials 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.



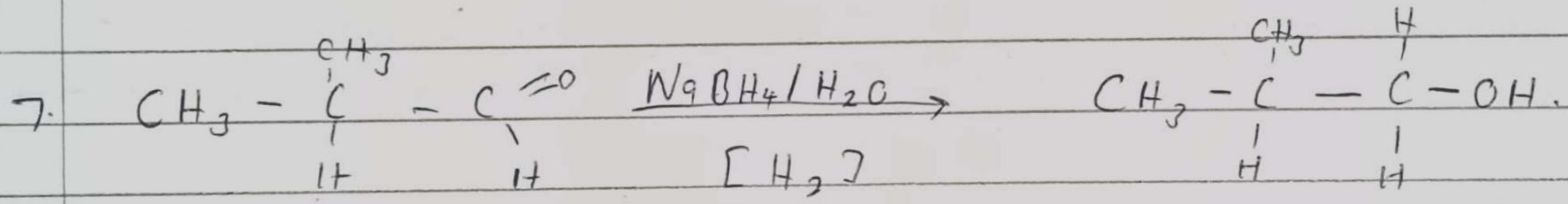
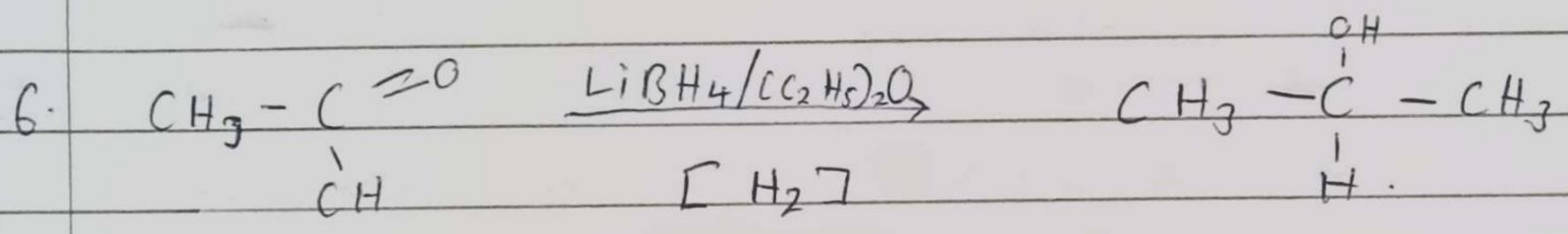
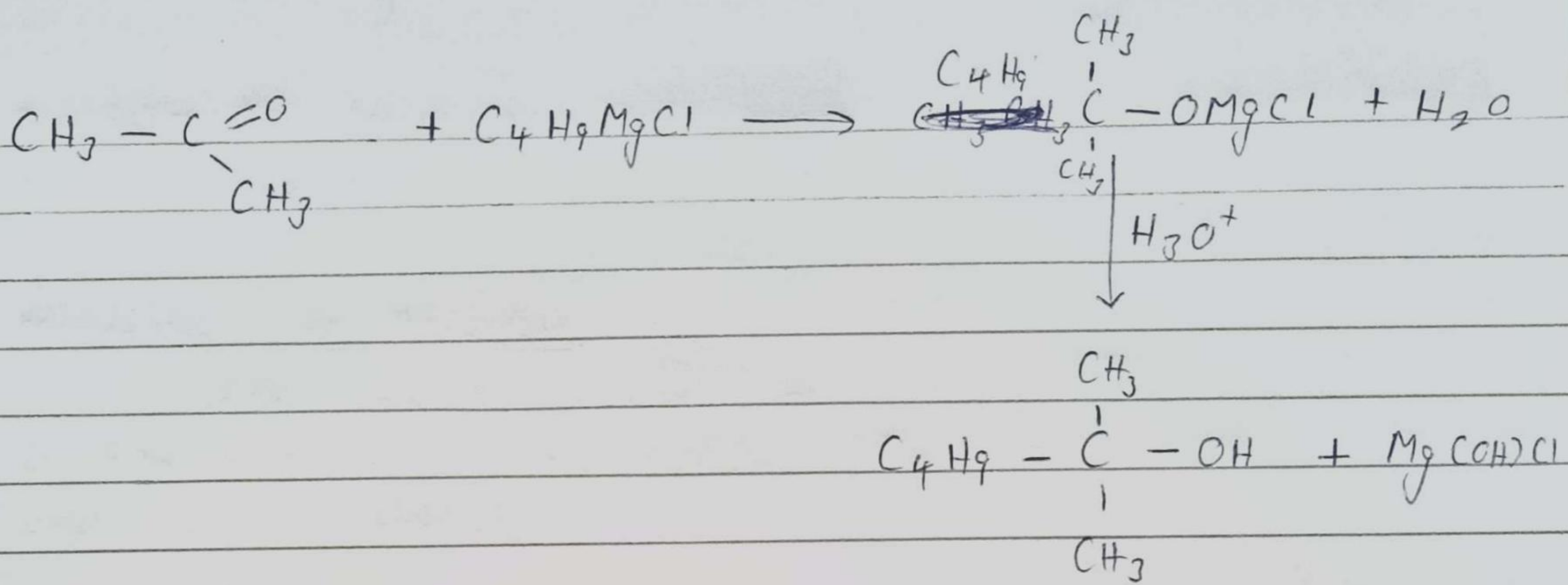
The maltose is broken down into glucose on addition of yeast which contains the enzyme, maltase and at a temperature of 15°C.



The glucose at constant temperature of 15°C is then converted into ethanol by the enzyme, zymase, contained also in yeast.

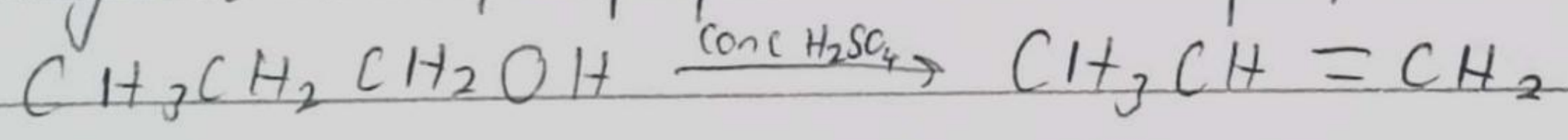






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8. (i) Dehydration of propan-1-ol to propene.



(ii) Hydrolysis of propene to propan-2-ol.

