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MECHATRONICS ENGINEERING

19/EN905/017

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

Answer

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

If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a PRIMARY ALCOHOL (1°).

If the number of hydrogen atom attached is one, it is called a SECONDARY ALCOHOL (2°).

If it has no hydrogen atom attached to the carbon atom bearing the hydroxyl group, it is called a TERTIARY ALCOHOL (3°).

Examples:

i. $\text{CH}_3\text{CH}_2\text{OH}$ - Ethanol - Primary Alcohol (1°)

ii. $(\text{CH}_3)_3\text{C}-\text{OH}$ - 2-Methylpropan-2-ol - Tertiary Alcohol (3°)

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 or triols have three hydroxyl groups present in the structure of the alcohols.

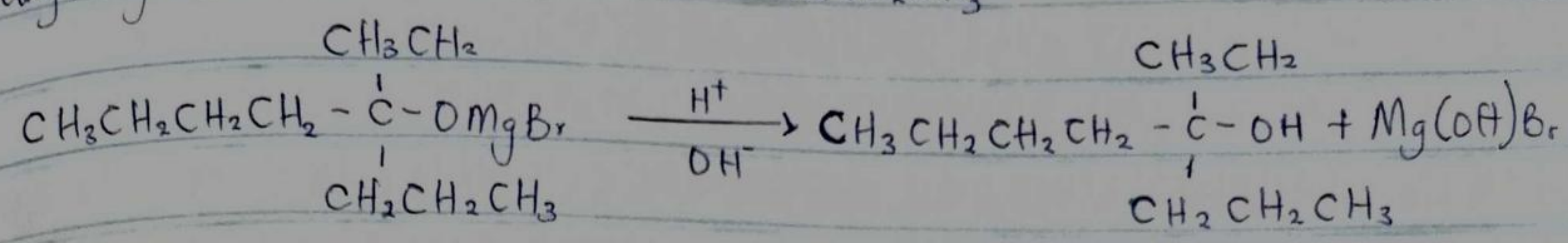
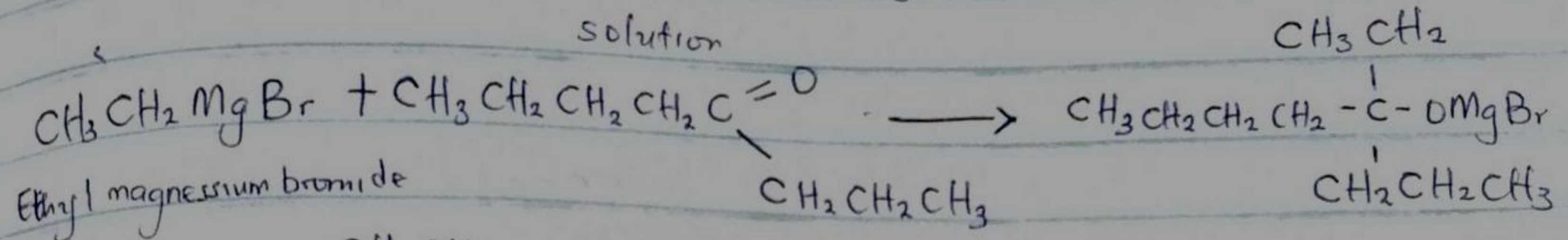
Polyhydric alcohols or polyols have more than three hydroxyl groups.

Examples are:

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ - Propanol - Monohydric alcohol.

$\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$ - Propane-1,2,3-triol - Trihydric alcohol.

2. In the Grignard synthesis of Alkanols, 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.

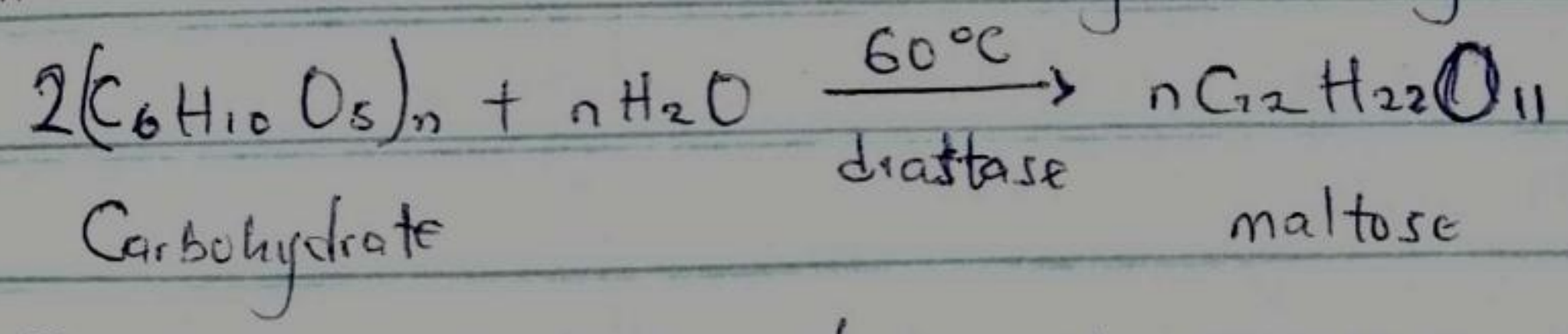


4-ethyl octan-4-ol
[Tertiary alcohol]

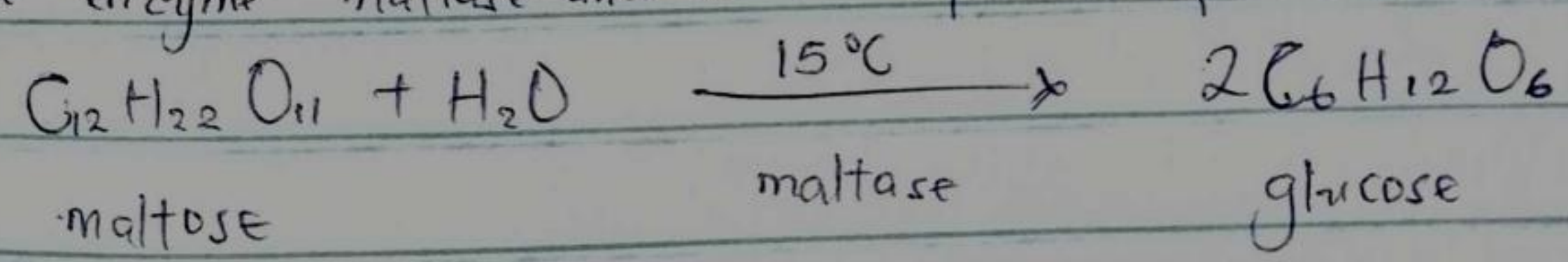
3. Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction.

solution

Carbohydrate such as starch are major group 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 molecule 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 a constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast

