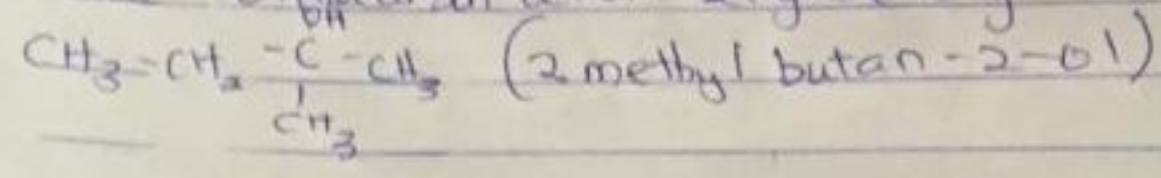


1. Alcohols are very important organic compounds. Discuss briefly their classification and give one example each.

a Primary alcohols ( $1^\circ$ ): Alcohols containing  $\text{CH}_3\text{CH}_2\text{OH}$  (Ethanol)

b Secondary alcohols ( $2^\circ$ ): contain only one hydrogen atom e.g.  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$

c Tertiary alcohols ( $3^\circ$ ): contain no hydrogen atom attached to the carbon atom being the e.g.



2. Discuss the solubility of alcohols in water, organic solvents

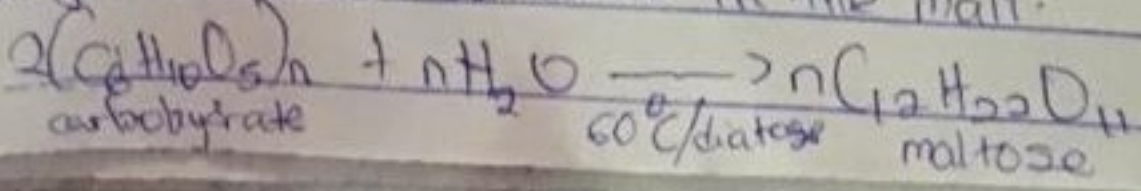
Solubility of alcohols in water, organic solvents

Alcohols with up to three carbon atoms are soluble in water as a result of their ability to form hydrogen with water.

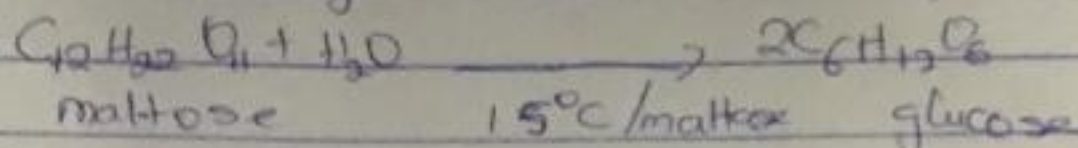
→ All monohydric alcohols are soluble in organic solvents

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

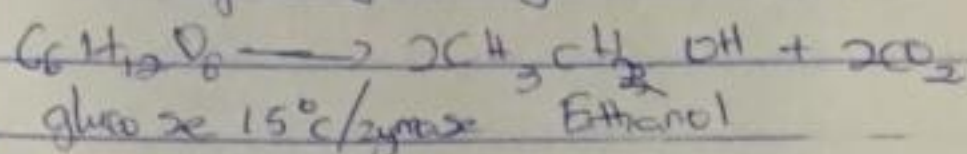
Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to  $60^\circ\text{C}$  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



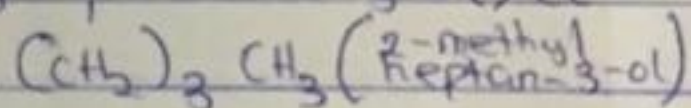
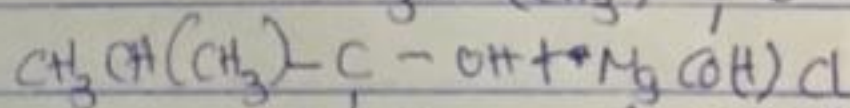
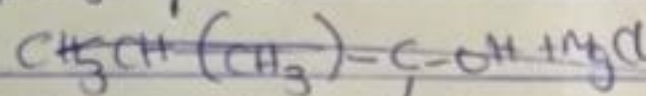
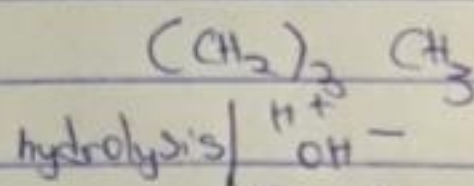
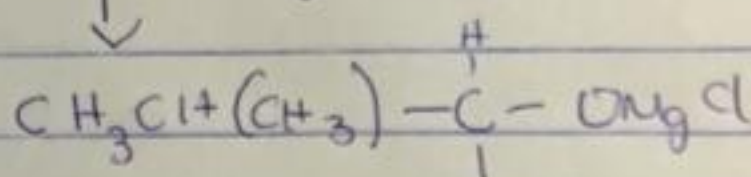
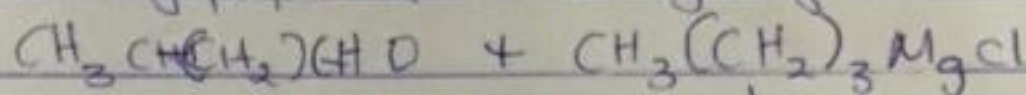
The glucose at constant temperature of 15°C is then converted into alcohol by enzyme zymase contained also in yeast



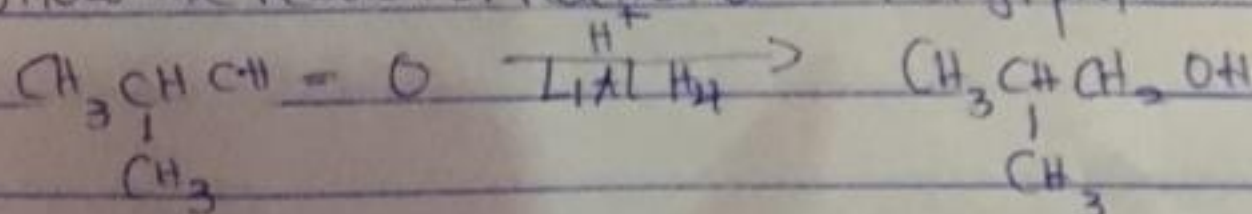
4. Show the reaction between 2-methylpropanal and butylmagnesium chloride

Hint: Grignard synthesis.

2-methylpropanal + butylmagnesium chloride



7. Show the reduction reaction of 2-methylpropanone



2-methylpropanone

2-methylpropanol

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

