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Department: Mechatronics Engineering

Matric Number: 19/ENG05/024

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1a Based on number of hydrogen atoms attached to carbon atoms containing the hydroxyl group:

- If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called primary alcohol (1°) e.g. CH_3OH (1°)
- If it is one hydrogen atom, it is called secondary alcohol (2°) e.g. $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ (2°)
- If no hydrogen atom, it is called tertiary alcohol (3°) e.g. $(\text{CH}_3)_3\text{C}-\text{OH}$ (3°)

b Based on the number of hydroxyl groups they possess

- Monohydric alcohols: have one hydroxyl group present in the alcoholic structure e.g. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- Dihydric alcohols: aka Glycols have two hydroxyl groups present in their alcoholic structure e.g. $\text{OHCH}_2\text{CH}_2\text{OH}$
- Trihydric alcohols: aka triols have three hydroxyl groups present in their alcoholic structure e.g. $\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$
- Polyhydric alcohols: or polyols have more than three hydroxyl groups e.g. $\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_3$

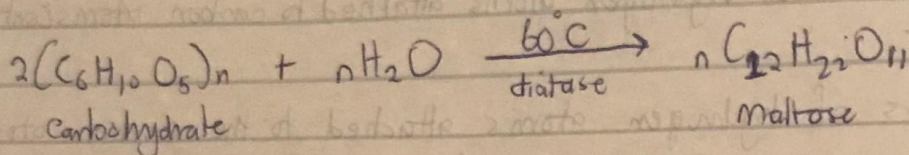
2a In water: lower alcohols with up to three carbon atoms in their molecules soluble in water because these lower alcohols can form hydrogen bonds with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass

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

3 Carbohydrates like starch are major group of natural compounds that can be made yield ethanol by the bio. biological process of fermentation

Step 1:

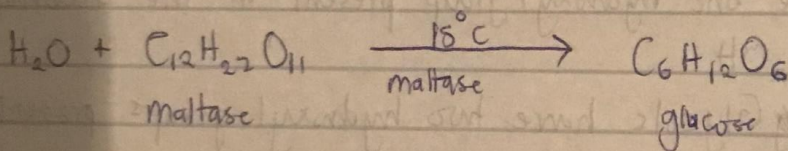
The starch containing content are warmed with malt to 60°C for a specific period of time are converted to maltose



NB: where n is large

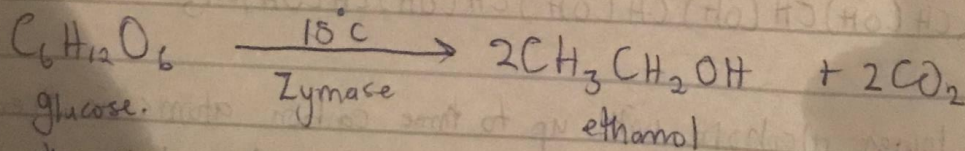
Step 2:

The maltose is broken down to glucose on addition of yeast (maltase) at temp 15°C



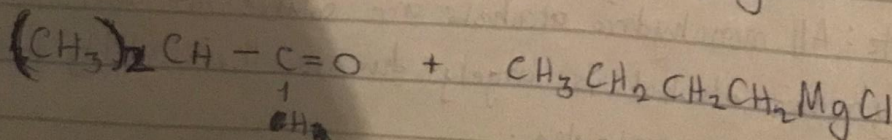
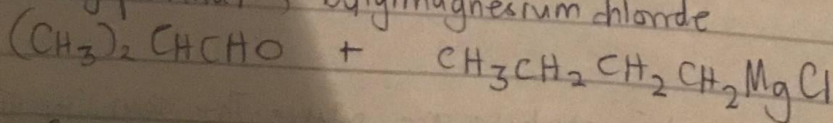
Step 3:

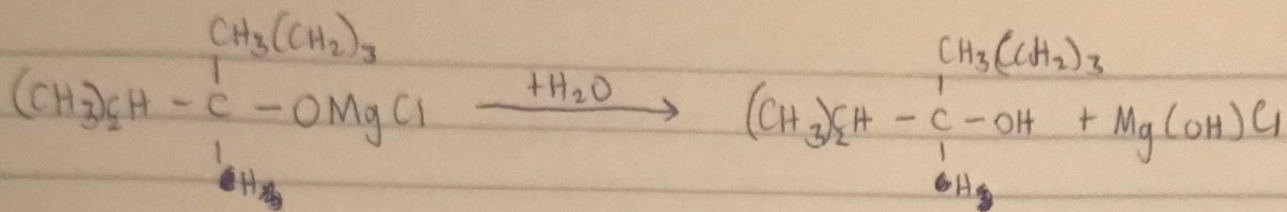
The glucose at constant temperature 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast



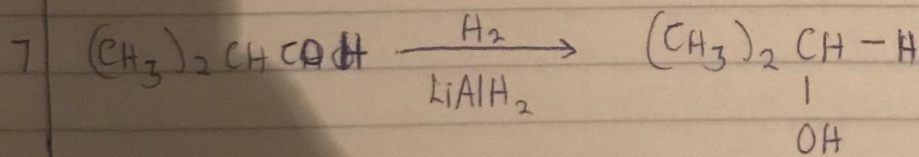
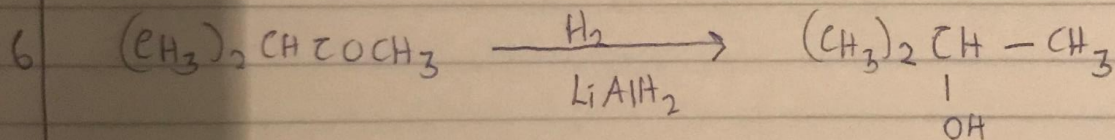
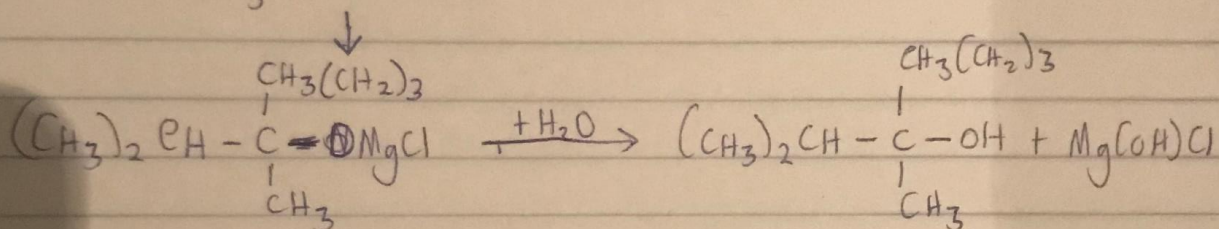
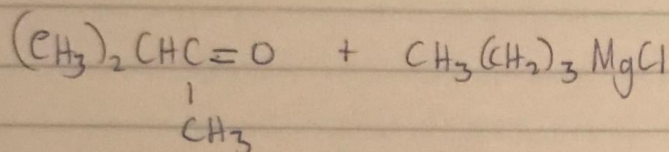
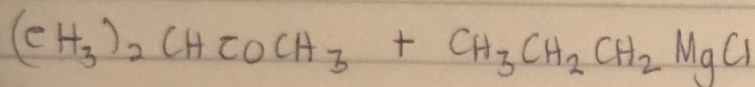
Therefore ethanol is produced.

4 2-methylpropanal, butylmagnesium chloride





5 2-methylpropanone, butylmagnesium chloride



8 propan-1-ol to propan-2-ol

