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LEVEL: 100

### Assignment

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

#### CLASSIFICATION OF ALCOHOLS

- a) This is 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 ( $1^\circ$ ). If it is one hydrogen atom, <sup>it is called secondary</sup> bearing the hydroxyl group, it is called a tertiary alcohol ( $3^\circ$ ).

E.g.  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$  Propan-2-ol ( $2^\circ$ )

- b) This is 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 while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups.

E.g.  $\text{HOCH}_2\text{CH}_2\text{OH}$  Ethane-1,2-diol  
(Dihydric alcohol)

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

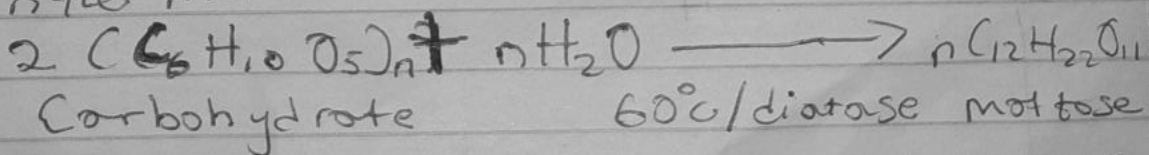
Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass. All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols ~~are~~ <sup>and</sup> polyhydric alcohols 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.

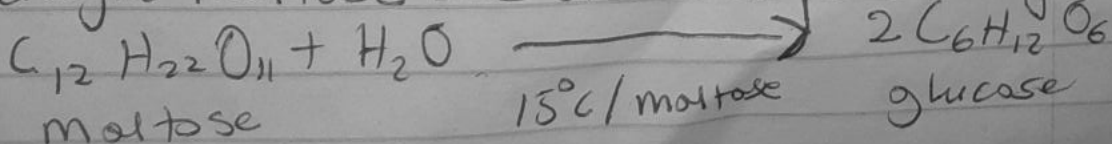
Production of ethanol

Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation.

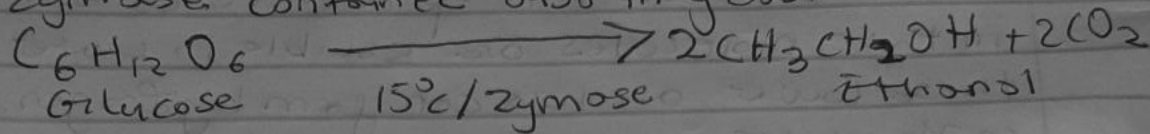
The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, ~~potatoes~~ <sup>potatoes</sup>, cereals, rice and on warming with to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt



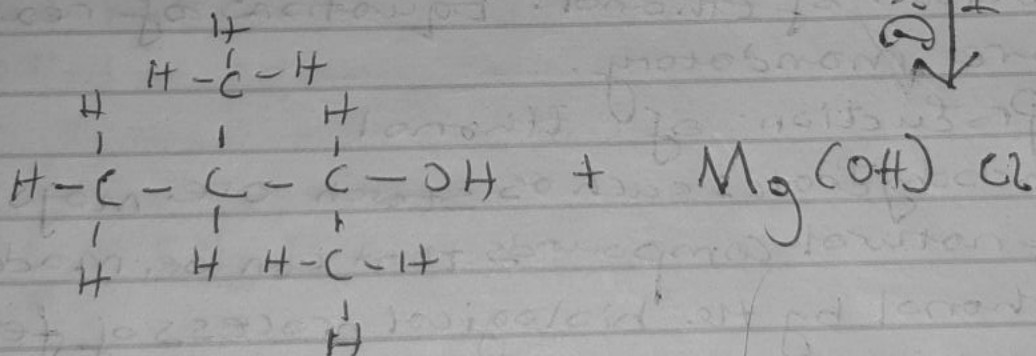
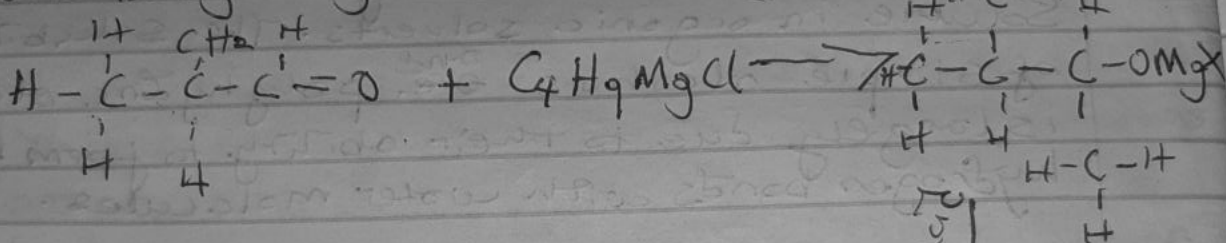
The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C



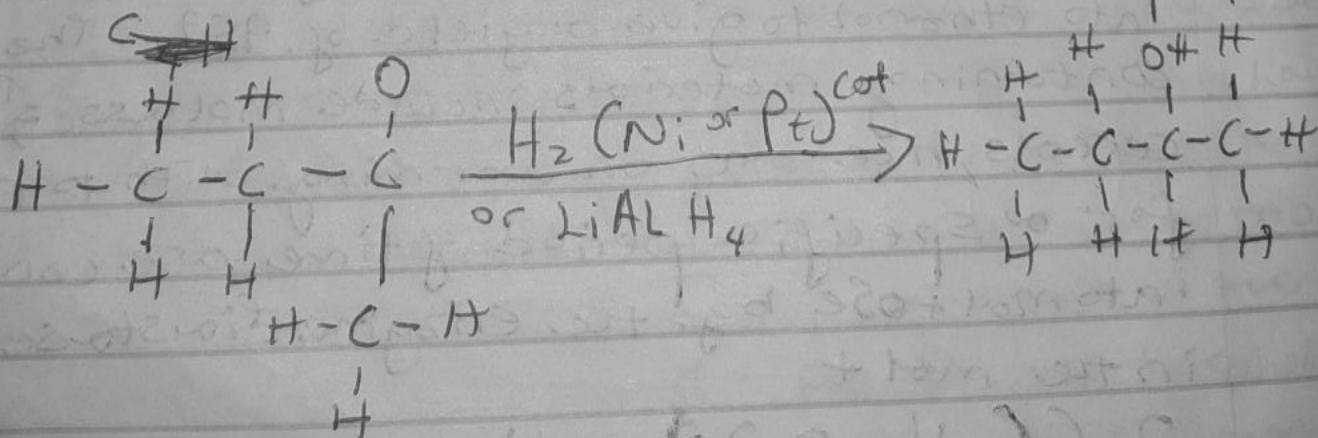
The glucose at ~~constant~~ <sup>constant</sup> temperature of  $15^{\circ}\text{C}$  is then converted into alcohol by the enzyme zymase contained also in yeast



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



7. Show the reduction reaction of 2-methyl propanal





8. Propose a scheme for the conversion of ~~prop~~ <sup>propan-1-ol</sup> to propan-2-ol

