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PHARMACOLOGY

MEDICINE & HEALTH SCIENCES

CHM 102

19/MHS07/002

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

a 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 three or two, it is called a primary alcohol ( $1^\circ$ ). If 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 ( $3^\circ$ ). Example;  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3 \rightarrow$  (Propan-2-ol).

b Based on the number of hydroxyl group they possess: - Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols also known as glycols have two hydroxyl groups present in the alcohol structure while ~~two~~ trihydric alcohols or triols have three hydroxyl groups present in the alcohol structure. Polyhydric alcohols or polyols have more than three hydroxyl alcohols. Example;  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  (~~2<sup>o</sup>~~ Propanol).

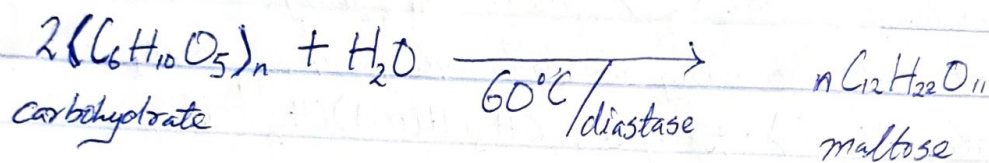
2 Discuss the solubility of ~~water~~ alcohols in water, organic solvents.

Alcohols are soluble in water. This is due to the lower alcohols with up to three carbon atoms in their molecules are because these lower alcohols can form hydrogen bond with water molecules. As the length of the hydrocarbon chain increases, the solubility in water decreases. 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.

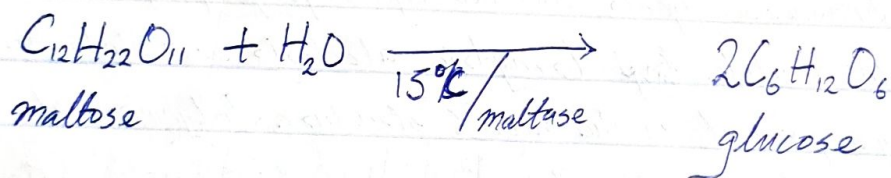
3 Show the three steps in the industrial manufacture of ethanol.  
Equation of reaction are mandatory.

Production of Ethanol:

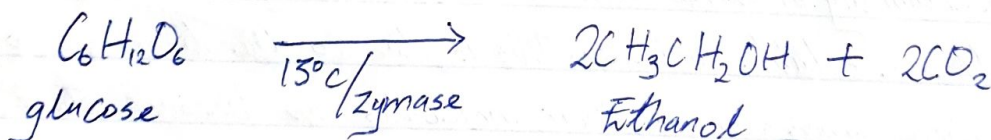
Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include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



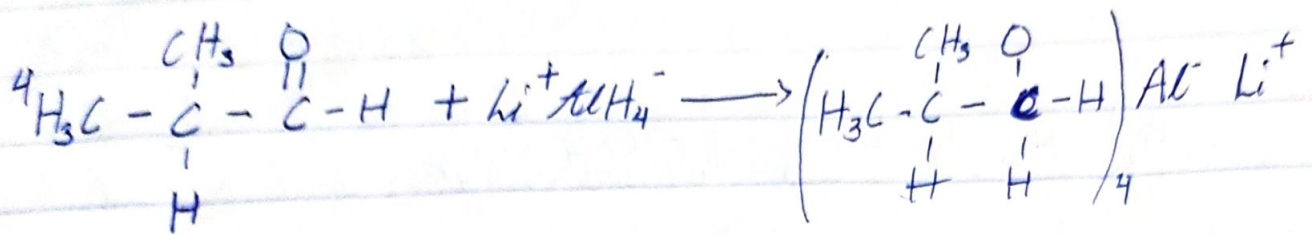
The maltose is broken down into glucose in addition of yeast which contains the enzyme maltase and at a temperature of  $15^{\circ}\text{C}$ .



The glucose at constant temperature of  $15^{\circ}\text{C}$  is then converted into alcohol by the enzyme Zymase contained also in yeast.

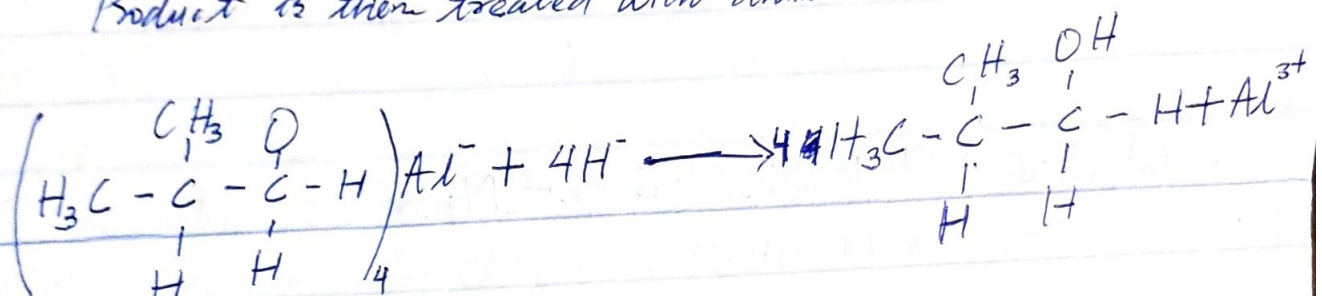


7 Show the reduction reaction of 2-methylpropanal.  
Using lithium tetrahydridoaluminate ( $\text{LiAlH}_4$ )



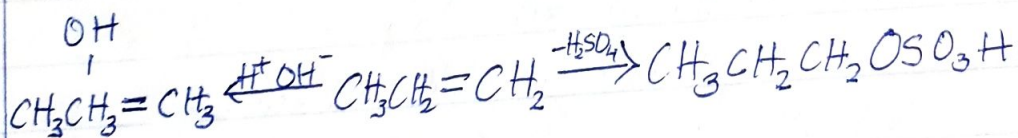
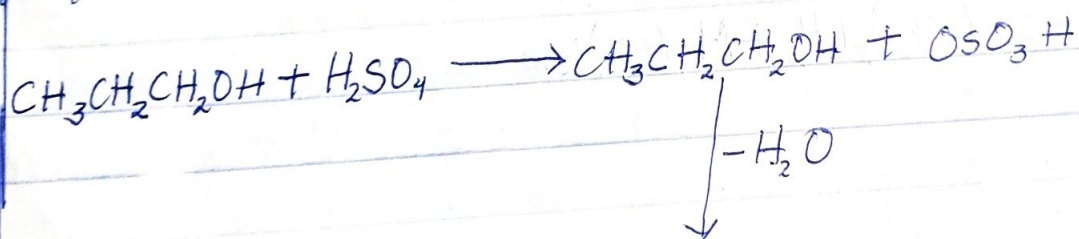
2-methylpropanal

Product is then treated with dilute acid



Product  $\Rightarrow$  2-methylpropanol.

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



4 Show the reaction between 2-methylpropanal and butylmagnesiumchloride. Hint: Grignard synthesis. Note: Show all structures.

