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CHM 102 Assignment

1.) Classifications of alcohols:

a) This is based on the number of hydrogen atom 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°). If it is one hydrogen atom, it is called secondary alcohol (2°) and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a tertiary alcohol (3°) e.g. $\text{CH}_3\text{CH}_2\text{OH}$ (ethanol) (1°).

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

2.) Solubility of alcohols in water and organic solvents:

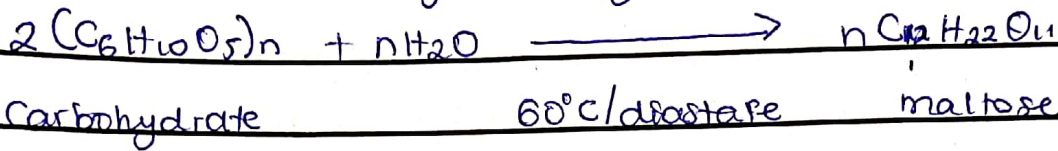
i) Water: Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bonds with water molecules. The water solubility of alcohols decrease with increasing relative molecular mass.

ii) Organic solvents: All monohydric ~~alcohols~~ ^{alcohols} are soluble in organic solvents. The higher members of alcohols are almost insoluble in water but are soluble in organic solvents like benzene, ether, etc.

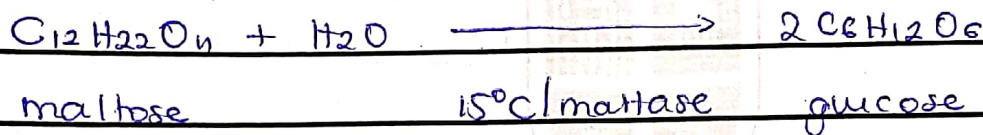
3.) Industrial manufacture of ethanol in three steps:

Carbohydrates such as starch ^{can} starch yield ethanol by the biological process of fermentation. The following steps are involved in this process!

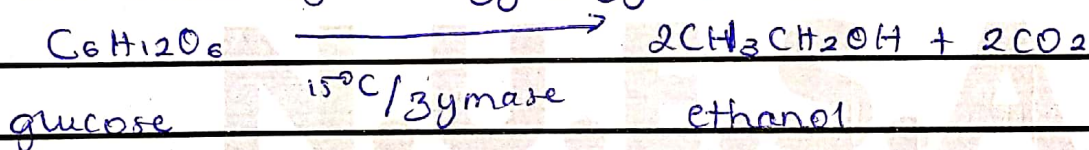
Step 1: The starch containing materials such as rice, cereals, potatoes, etc. on warming with ~~malt~~ ^{malt} to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



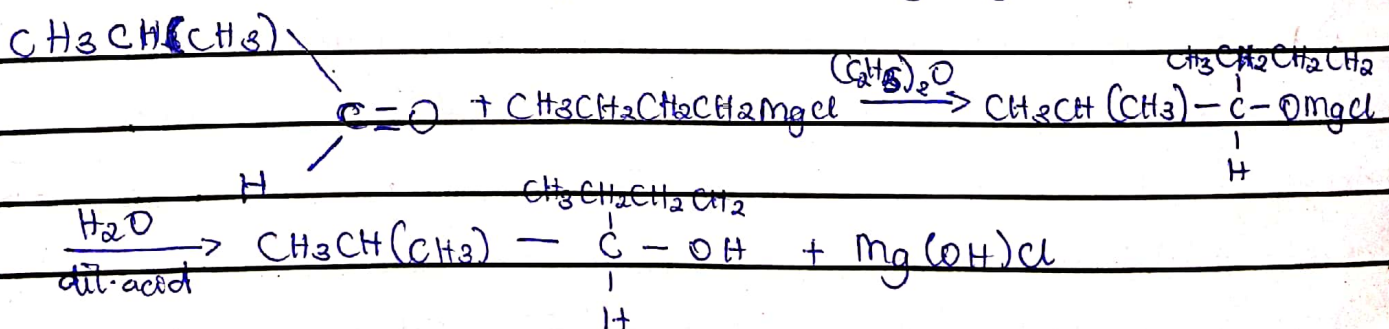
Step 2: The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C



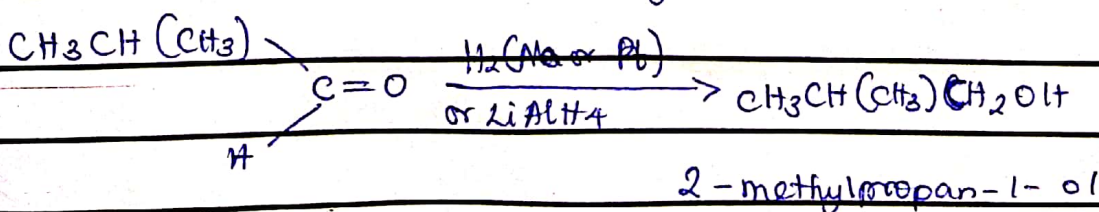
Step 3: The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme zymase contained also in yeast.



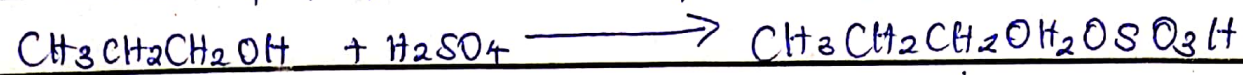
4.) Reaction between 2-methylpropanal and butylmagnesiumchloride.



7.) Reduction reaction of 2-methylpropanal



8.) Conversion of propan-1-ol to propan-2-ol



propan-1-ol

