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DEPT: MEDICINE AND SURGERY

COURSE: CHM 102

1. Classification of Alcohols

A. Classification based on the number of hydrogen atoms attached to the carbon atom containing the OH group

- i. If 2 or 3 hydrogen atoms are attached to the carbon atom bearing the OH group, it is called a primary alcohol (1°).
- ii. If one hydrogen atom is attached, it is called a secondary alcohol (2°).
- iii. If no hydrogen atom is attached to the carbon atom, it is a tertiary alcohol (3°).

Examples.

Methanol CH_3OH (1°)

Propan-2-ol $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ (2°)

B. Classification based on the number of hydroxyl groups they possess. Monohydric alcohols have one OH group present in the alcohol structure. Dihydric alcohols are called glycols, they have 2 hydroxyl groups present in the structure while trihydric alcohols or triols have 3 OH groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than 3 OH groups.

Examples

Monohydric alcohol - Propanol $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

Dihydric alcohol - Ethane-1,2-diol $\text{HOCH}_2\text{-CH}_2\text{OH}$

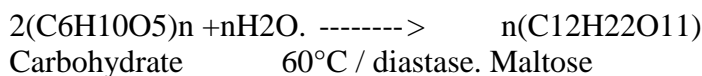
2. Solubility of alcohols in water and organic solvents

Alcohols are soluble in water. This is due to the hydroxyl group in the alcohol which is able to form hydrogen bonds with water molecules. Alcohols with a smaller hydrocarbon chain are very soluble. As the length of the hydrocarbon chain increases, the solubility in water decreases. The reason why the solubility decreases as the length of hydrocarbon chain increases is because it requires more energy to overcome the hydrogen bonds between the alcohol molecules as the molecules are more tightly packed together as the size and mass increases. Generally, non polar solutes are soluble in non polar solvents. Alcohol is soluble in organic solvents.

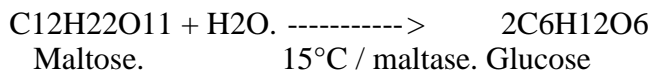
3. Industrial manufacture of Ethanol

Carbohydrate 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

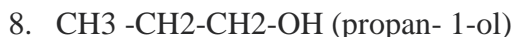
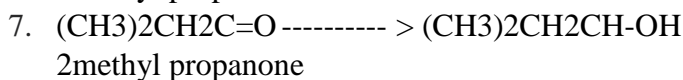
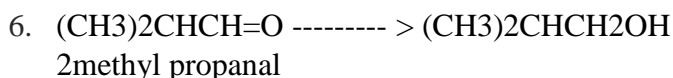
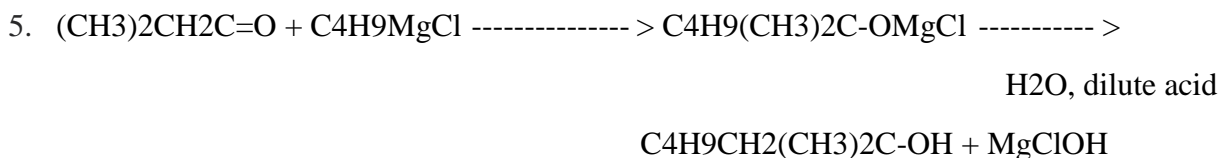
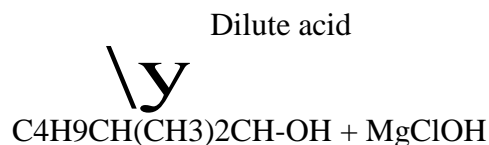
95%. On warming starch with malt to 60° for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



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



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



Heat in the presence of concentrated H₂SO₄ ,to dehydrate it and form propene (CH₂=CH-CH₃)₂



Now to propene add water (you may use mercuric acetate as it favours Markownikoff addition)
 $CH_3-CH=CH_2 + H_2O = CH_3-CH(OH)-CH_3$ (propan-2-ol)

