

10/05/2020

Chem 102

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MBBS

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

ans: Based on hydroxyl groups: 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 group present in the structure of the alcohol. polyhydric alcohols or polyols have more than three hydroxyl groups eg ^{Propanol} $\text{CH}_2\text{OHCH}_2\text{CH}_2\text{OH}$

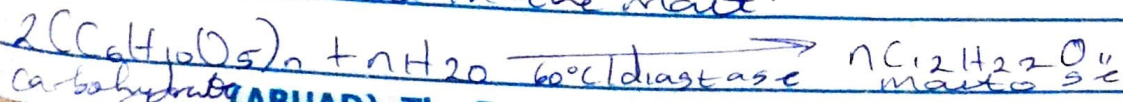
ii) Based on the number of hydrogen atoms attached to the carbon atoms containing the hydroxyl group: primary alcohols (1°) are alcohols bearing two or three hydrogen atoms attached to the carbon atom bearing the hydroxyl group. If it is one hydrogen atom, it is called secondary alcohol (2°) and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a tertiary alcohol (3°). Eg CH_3OH (Methanol (1°))

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

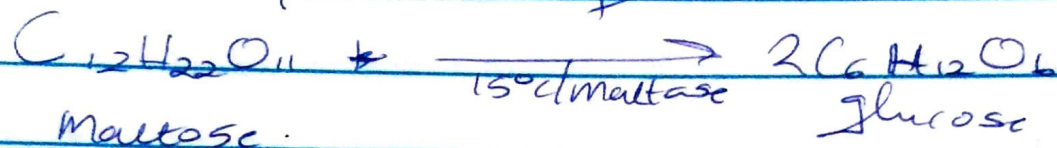
ans: Solubility - lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decrease with increasing relative molecular mass. All monohydric alcohols are soluble in organic solvent. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bond with water molecules.

3) Show the three steps in the industrial manufacture of ethanol. Equations of reactions are mandatory.

ans - (a) Breaking of carbohydrates to disaccharides, the process begins with the biological process of fermentation. The biological catalysts enzymes found in yeast, break down the carbohydrate molecule into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on cooking with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase used contained in the malt.

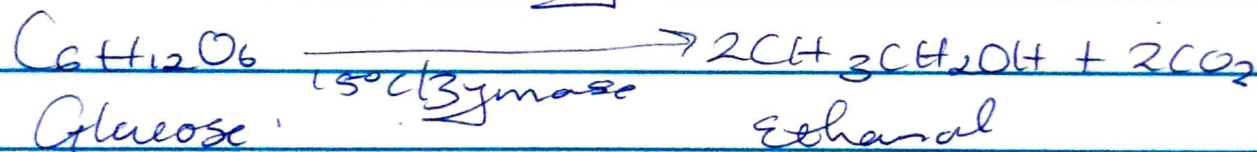


3) Breaking of disaccharides to monosaccharides: The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C



4) Breaking down of glucose to ethanol.

The glucose at constant temperature of 15°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. Hence illustrate Grignard synthesis.

