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DEPARTMENT: NURSING

MATRIC NUMBER: 19/MHS02/021

COURSE: CHEM 102

ASSIGNMENT

Q1. Alcohols are very important organic compounds. Discuss briefly their classification and give one example each.

Alcohols are classified 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 a primary alcohol (1°). If it is one hydrogen atom, it is a secondary alcohol (2°) and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is a tertiary alcohol (3°). Examples; CH_3OH – Methanol (1°), $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ - Propan-2-ol (2°), $(\text{CH}_3)_3\text{C-OH}$ – 2-Methylpropan-2-ol (3°).
- The number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols 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 have more than three hydroxyl groups. Examples; $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ - Propanol (Monohydric alcohol), $\text{HOCH}_2\text{CH}_2\text{OH}$ - Ethane-1,2-diol (Dihydric alcohol), $\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$ - Propane-1,2,3-triol (Trihydric alcohol), $\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_3$ - Heptane-2,3,4,5,6-pentaol (Polyhydric alcohol).

Q2. Discuss the solubility of alcohols in water, organic solvents.

Solubility of alcohols;

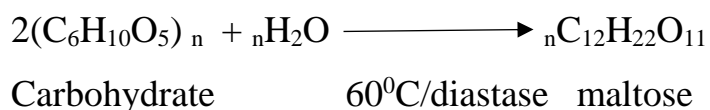
- In water: Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.
- In organic solvents: All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols and polyhydric alcohols is largely due to form hydrogen bonds with water molecules.

Q3. Show the three steps in the industrial manufacture of ethanol. Equations are mandatory.

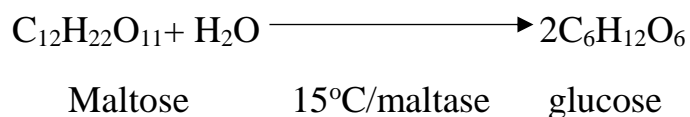
Industrial manufacture of ethanol.

Ethanol is produced from carbohydrates through the biological process called fermentation. It involves the use of some enzymes or catalyst in three steps:

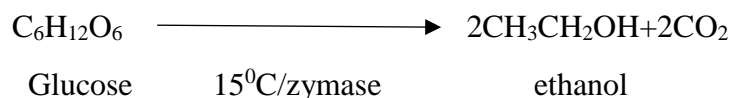
Step1: It is produced on warming the starch with malt to 60⁰C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



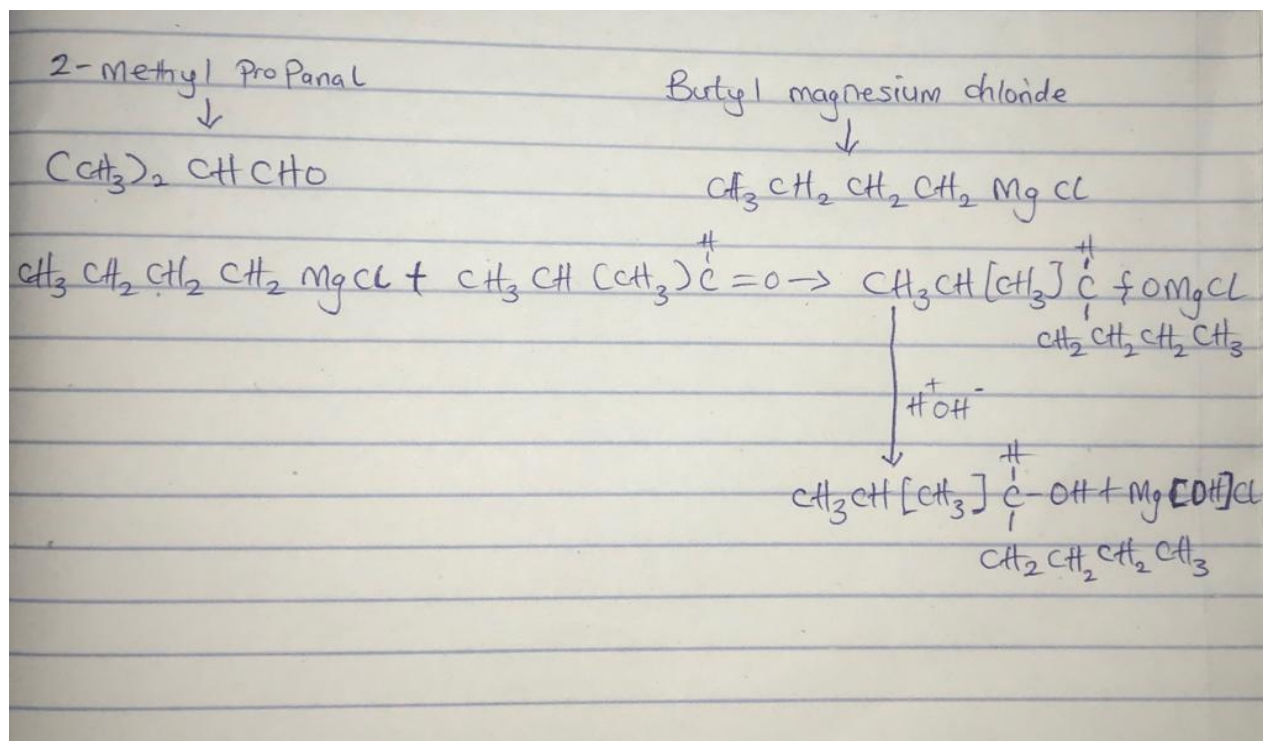
Step2: The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15⁰C



Step3: The glucose at constant temperature of 15⁰C is then converted into alcohol by the enzyme zymase contained in the yeast

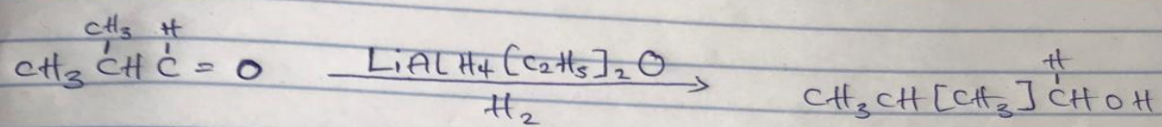


Q4. Show the reaction between 2-methyl propanal and butyl magnesium chloride.
Hint: Grignard synthesis.



Q7. Show the reduction of 2-methyl propanal.

2-Methyl Propanal



Q8. Propose a scheme of the conversion of propan-1-ol to propan-2-ol.

Propan-1-ol to Propan-2-ol

