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CHEM102 ASSIGNMENT

MBBS 19/MHS01/192

1. Alcohols can be classified into two;

a) Based on the number of hydroxyl groups they possess. Alcohols containing one hydroxyl groups present in their alcohol structure are known as monohydric alcohols. Alcohols containing two hydroxyl groups in their alcohol structure are known as dihyric alcohols or glycols while alcohols containing three hydroxyl groups in their atomic structure are known as triols or trihydric alcohols. Polyhydric alcohols or polyols have more than three hydroxyl groups. An example is $CH_3CH_2CH_2OH$ (Propanol) which is a monohydric alcohol.

b) Based on the number of carbon atoms attached to the carbon atom containing the hydroxyl group; here we have primary, secondary and tertiary alcohols. When the number of hydrogen atoms attached to the carbon atom with the hydroxyl group are two or three, it is called primary alcohol (1^0). When it is two hydrogens, it is called secondary alcohol but if no hydrogen atom is attached to the carbon atom with the hydroxyl group, it is called tertiary alcohol. An example is CH_3CH_2OH (Ethanol) which is I a primary alcohol.

2. The solubility of Alcohols; alcohols with up to three carbon atoms in their molecules are soluble in water because the lower alcohols can form hydrogen bonds with water molecules. Then the water solubility of alcohol decreases with increasing relative molecular mass. All monohydric alcohols are soluble in organic solvents.

3. Steps for the industrial production of alcohol

Step 1; the starch containing material is warmed with malt to 60^0C for a specific period of time then is converted into maltose by enzyme diastase contained in the malt.

carbohydrate 60^0C/diastase maltose

$$2(C_6H_{10}O_5)_n + nH_2O \longrightarrow nC_{12}H_{22}O_{11}$$

Step 2; the maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15^0C.

Maltose 15^0C/maltase glucose

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow 2C_6H_{12}O_6$$

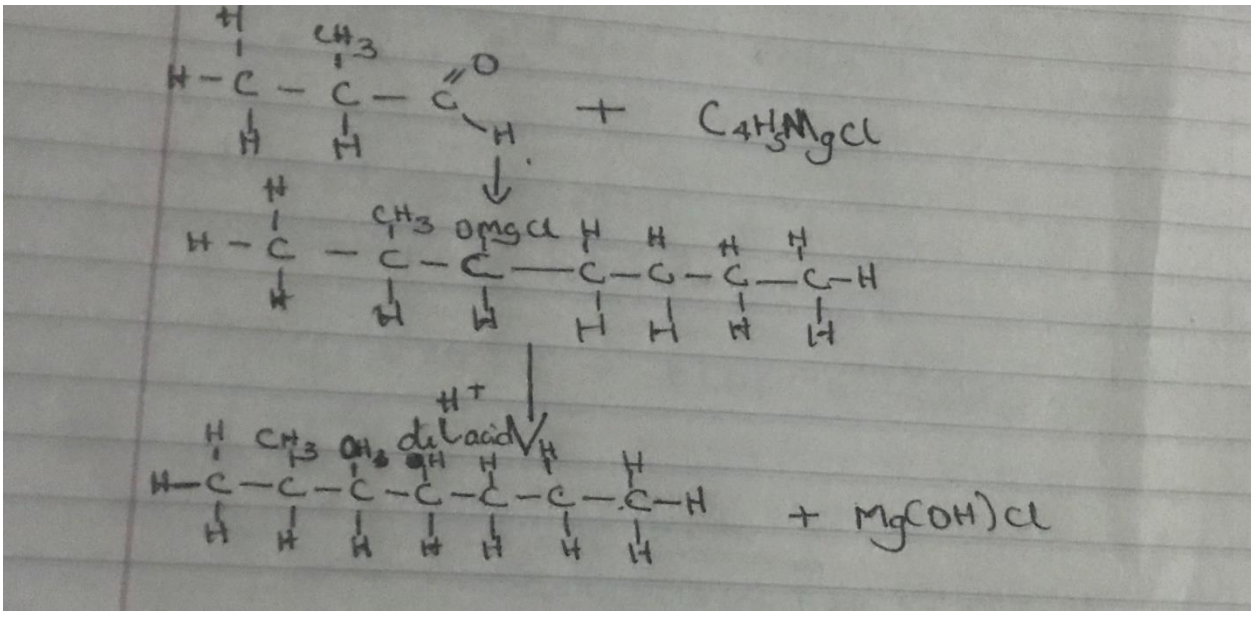
Step 3; The glucose at constant temperature of 15^0C is then converted into alcohol by the enzyme zymase contained in yeast.

Glucose 15^0C/zymase ethanol

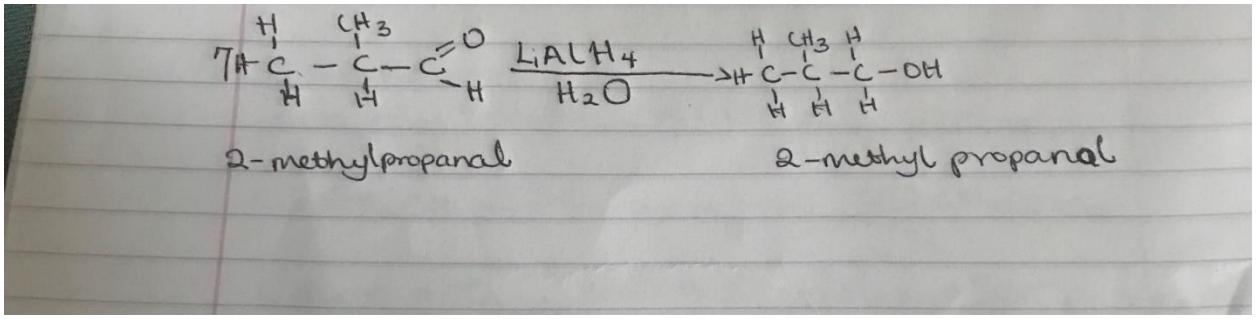
$$C_6H_{12}O_6 \longrightarrow 2CH_3CH_2OH + 2CO_2$$

4. The reaction between 2-methylpropanal and butylmagnesiumchloride

Gringard synthesis between butylmagnesium chloride and 2-methylpropanal.



7. The reduction reaction of 2-methylpropanal



8. Scheme for the conversion of propan-1-ol to propan-2-ol:

a) dehydration of the conversion of propan-1-ol to propene:

When propan-1-ol is treated with concentrated tetraoxosulphate (VI) acid the phenomenom called dehydration takes place. Due to this, a water molecule from propan-1-ol gets eliminated then propene is formed.

Pronan-1-ol conc. H_2SO_4 propene

$CH_3CH_2CH_2OH \longrightarrow CH_3CH{=}CH_2$

b) Hydrolysis of propene to propan-2-ol:

Propene can be hydrolysed to propan-2-ol through a mechanism called Markownikoffs rule which states that “when anunsymmetrical alkene reacts with hydrogen halide to give an alkyl halide, the hydrogen adds to the carbon of the

alkene that has the greater number of hydrogen substituents, and the halogen to the carbon of the alkene with the fewer number of hydrogen substituents".

In this case the unsymmetrical reagent used is H_2O which composes of H^+ an OH^- due to this hydrolysis of water the negative part attaches itself to the propene and thus converts it to propan-2-ol.

Propene H_2O propan-2-ol

$CH_3\text{-}CH{=}CH_2 \longrightarrow CH_3\text{-}CH_2\text{-}OH\text{-}CH_3$