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Assignment:

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

Ans: Alcohols are organic compounds that contain carbon, hydrogen and oxygen. If is aliphatic (chain or ring), we have its general formula to be  $C_n H_{2n+2} OH$  or  $R-OH$

There are two methods of classification:

a) Based on the number of hydrogen atoms attached to the carbon carrying the OH functional group. If the number of atoms attached to the carbon with the functional group is 2 or 3, it is called a Primary alcohol. If there is only one attached, it is called Secondary alcohol. If there is none attached, it is called tertiary alcohol.

Primary Alcohol:



butan-1-ol

Secondary Alcohol



isopropanol

Tertiary Alcohol



tert-butanol

b) This is based on the number of OH groups in the structure of the alcohol. If there is just 1 in the structure of the alcohol, it is called monohydric Alcohol. When it is 2, it is called Dihydric Alcohol or glycol. If it is 3, it is called Trihydric Alcohol or Triol. When they are more 3, it is called Polyhydric Alcohol.

Polyol

Monohydric Alcohol



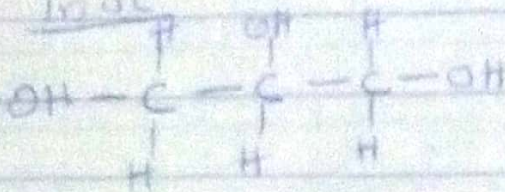
Propanol

Glycol



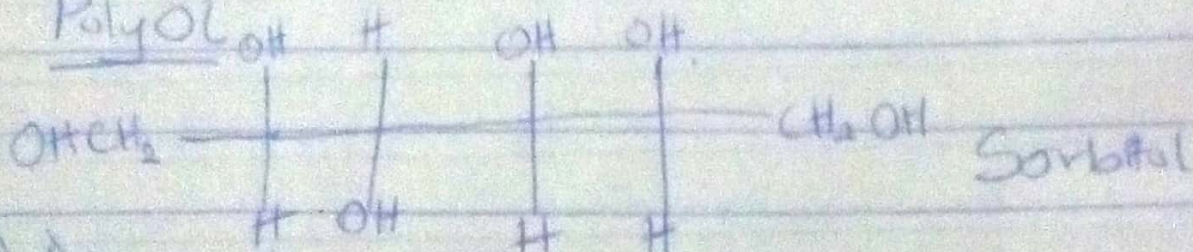
ethane-1,2-diol

Triol



Propane-1,2,3-triol

Polyol

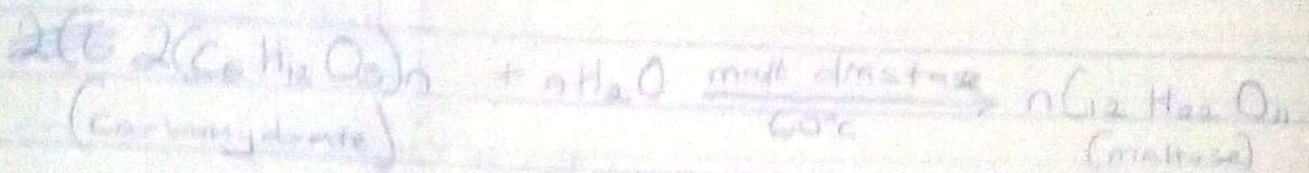


Sorbitol

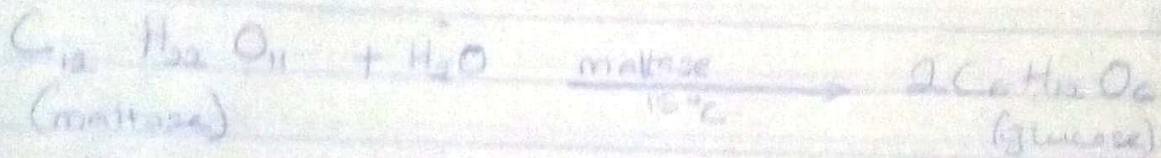
2) Discuss the solubility of alcohols in water, organic solvents  
Ans Water: Alcohols are soluble in water. This is due to the hydroxyl group in the alcohol which is able to form hydrogen bonds with water molecules. Alcohols with a smaller hydrocarbon chain are very soluble. As the length of the hydrocarbon chain increases, the solubility in water decreases.

② Show the three steps in the industrial manufacture of ethanol. Equations are mandatory.

Step 1: Starch containing carbohydrates are converted to maltose on warming with malt to give by enzyme diastase with malt

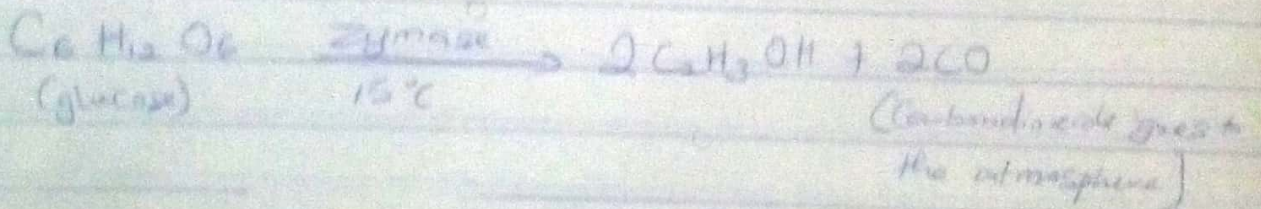


Step 2

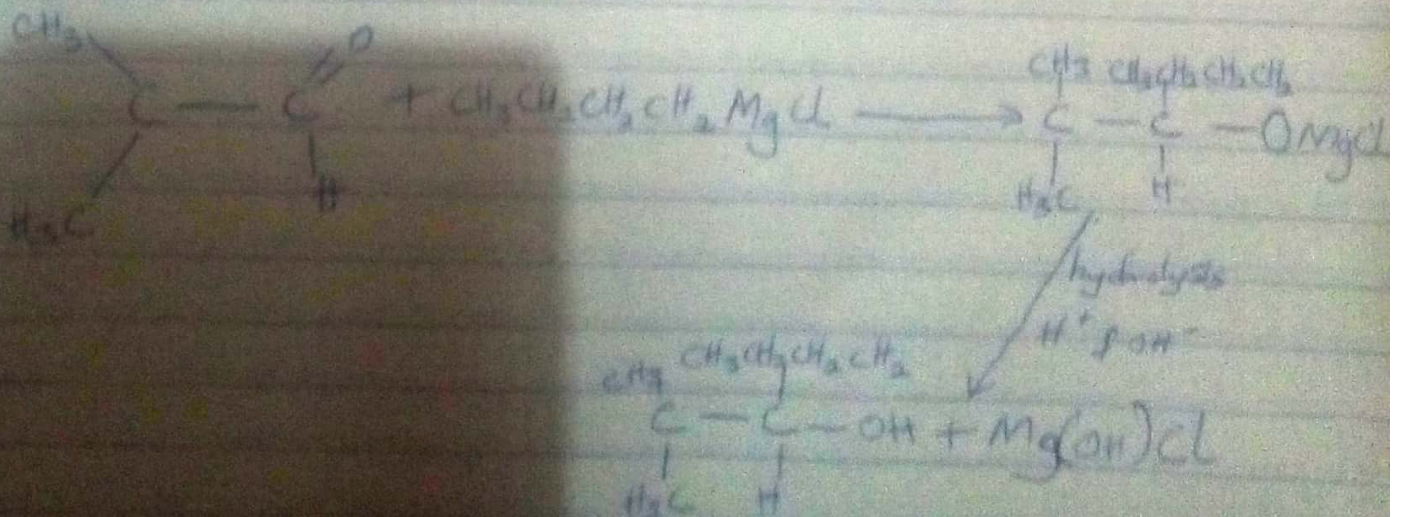


The maltose is then converted to glucose by heating to 15°C with an enzyme maltase (catalyst)

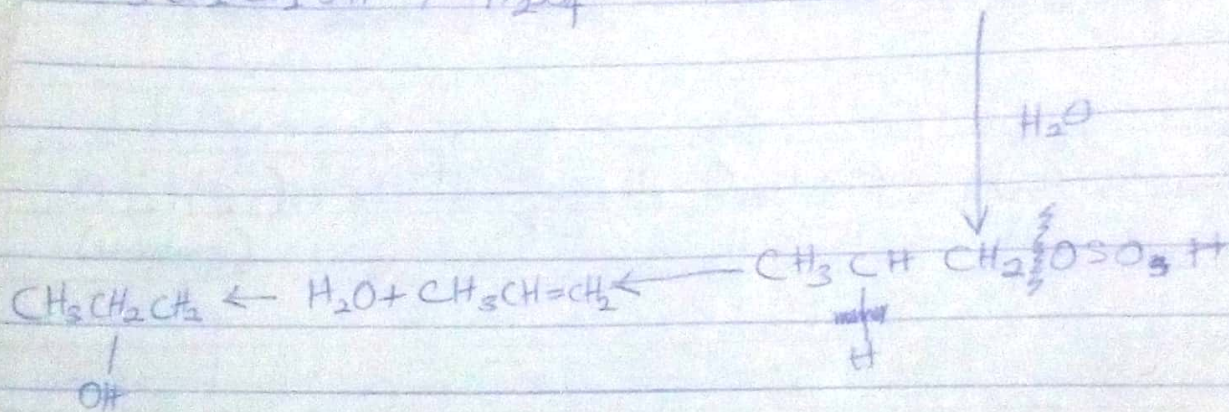
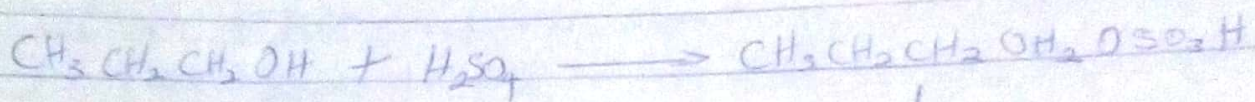
Step 3



④ Show the reaction between 2-methyl propanal and butyl magnesium chloride. Hint: Grignard Synthesis



8) Propose a scheme for the conversion of Propan-1-ol to Propan-2-ol.



Propan-2-ol