

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

Answer

1) This is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. Example primary alcohol (1°), Secondary alcohol (2°) and tertiary (3°) alcohol - CH_3OH Methanol (1°), $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ Propan-2-ol (2°) and methylpropan-2-ol (3°).

2) This is based on the number of hydroxyl groups they possess. That is, monohydric alcohol, dihydric alcohol or glycol and trihydric alcohol. Eg $\text{C}_2\text{H}_5\text{OH}$ propanol (monohydric alcohol), $\text{HOCH}_2\text{CH}_2\text{OH}$ Ethane-1,2-diol (Dihydric alcohol) and $\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$ Propene-1,2,3-triol (Trihydric alcohol).

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

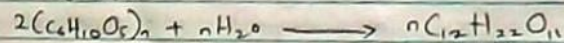
Solubility in water: Lower alcohols with up to three carbon atoms in their molecules are soluble in water.

because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.

Organic Solvent: All monohydric alcohols are soluble in solvents. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bond with water molecules.

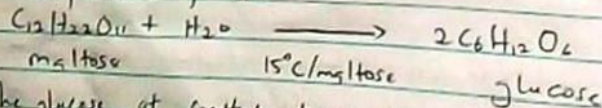
3 Show the three steps in the industrial manufacture of ethanol. Equations of reaction are mandatory.

The starch containing materials include endosperm, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



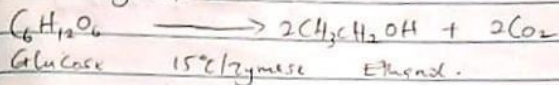
Carbohydrate $\xrightarrow{60^\circ\text{C}/\text{diastase}}$ Maltose

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



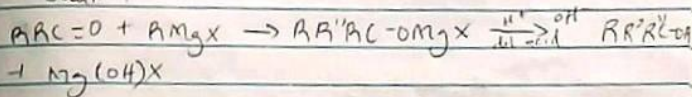
The glucose at constant temperature of 15°C is then

Converted into alcohol by the enzyme Zymase contained also in yeast

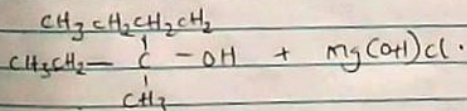
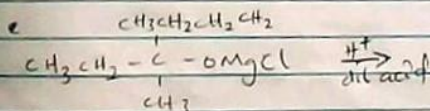
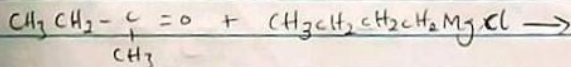


Show the reaction between 2-methylpropanal and ethylmagnesium chloride: Grignard Synthesis.

Solution

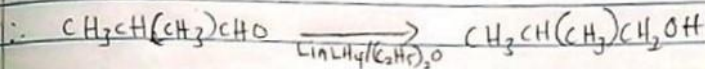
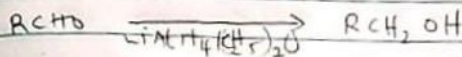


Step:



octan-4-ol

7 Show the reduction- reaction of 2-methylpropanal

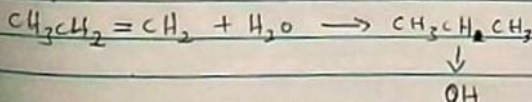
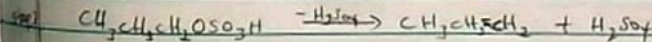
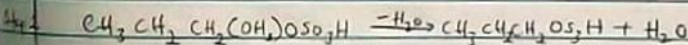
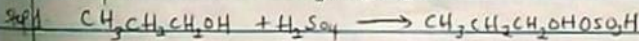
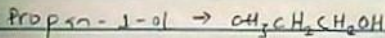


Aldehyde

Primary alcohol (1°)

2-methylpropan-1-ol.

8 Propose a scheme for the conversion of propan-1-ol to propan-2-ol solution.



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OH