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1a It is based on the number of the hydrogen atom attached to the carbon atom bearing the hydroxyl group. If the number of hydrogen atom attached to the carbon atom bearing the hydroxyl group is two / three, it is called a PRIMARY ALCOHOL (1°), if it is one it is called a SECONDARY ALCOHOL (2°), and if no hydrogen atom is attached to the carbon-bearing the OH group it's called TERTIARY ALCOHOL (3°)

Examples. CH_3OH-methanol (1°), $CH_3CH(OH)CH_3$-propan-2-ol (2°)

b It is based on the number of hydroxyl group they possess.

* Monohydric alcohol - has one OH group present in the alcohol structure
* Dihydric alcohol / glycol - has two OH group present in the alcohol structure
* Trihydric Alcohol / triols - has three OH groups present in the alcohol structure
* Polyhydric alcohols / polyol - has more than three hydroxyl group

Examples : $CH_3CH_2CH_2OH$ - propanol (Monohydric alcohol)

$HOCH_2CH_2OH$ - ethane-1,2,-diol (Dihydric alcohol

2 $CH_3CH_2MgBr + CH_3CH_2CH_2CH_2-\underset{\underset{CH_2CH_2CH_3}{|}}{C}=O \longrightarrow CH_3CH_2CH_2CH_2-\underset{\underset{CH_2CH_2CH_3}{|}}{\overset{\overset{CH_3CH_2}{|}}{C}}-OMgBr$

$\xrightarrow[\text{dil acid}]{H^+OH^-}$

$CH_3CH_2CH_2CH_2-\underset{\underset{CH_2CH_2CH_3}{|}}{\overset{\overset{CH_3CH_2}{|}}{C}}-OH + Mg(OH)Br$

3 Production of ethanol

i The starch containing materials include molasses, potatoes, rice etc and on warming with malt to 60°C for a specific period, is converted into maltose by the enzyme diatase in malt.

$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow[60°C]{\text{diatase}} nC_{12}H_{22}O_{11}$

carbohydrate — maltose

ii Maltose is then converted into glucose using yeast which contain the enzyme maltase and at a temperature of 15°C

$nC_{12}H_{22}O_{11} + H_2O \xrightarrow[15°C]{\text{maltase}} 2C_6H_{12}O_6$

The glucose at a constant temperature of 15°C is converted to

ethanol by the enzyme zymase contained also in yeast

$$C_6H_{12}O_6 \xrightarrow[15^\circ C]{\text{Zymase}} 2\,CH_3CH_2OH + 2CO_2$$

4 Aldehydes (alkanals) and Ketones (alkenone) are reduced to primary and secondary alcohols respectively by reaction with hydrogen in the presence of a platinum or nickel catalyst or aluminum isopropoxide or with complex metal hydride such as $LiAlH_4$

$$R-\underset{H}{\overset{}{C}}=O \xrightarrow[\text{or } LiAlH_4]{H_2(Ni/Pt)\,cat} RCH_2OH$$

Primary alcohol

$$R-\underset{R'}{\overset{}{C}}=O \xrightarrow[\text{or } LiAlH_4]{H_2(Ni/Pt)\,cat} R\underset{OH}{\overset{|}{C}}H-R'$$

Secondary alcohol

Specific examples

* $CH_3CH_2C(=O)H \xrightarrow[H_2O]{LiAlH_4} CH_3CH_2CH_2OH$

1° alcohol

* $CH_3CH_2C(=O)CH_3 \xrightarrow{H_2/Ni} CH_3CH_2\underset{OH}{\overset{|}{C}}H-CH_3$

2° Alcohol