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DEPARTMENT: MBBS

A. CLASSIFICATION OF ALCOHOLS

1. This is based on the number of hydrogen atoms attached to the atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are two or three, it is called a primary alcohol. If it is one hydrogen atom it is called secondary alcohol and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a tertiary alcohol. Examples are CH_3OH (METHANOL), CH_3CH_2OH (ETHANOL).
2. This is based on the number of hydroxyl group they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called gycols have two hydroxyl groups present In the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohols. Polyhydric alcohols or polyols have more then three hydroxyl groups.

Examples are $CH_2CH_2CH_2OH$ Propanol(monohydric alcohol) ,pentaol(polyhydric alcohol)

B. In the grinard synthesis of alkanols react a named reagent with an alkanone

Showing reaction steps

$$CH_3CH_2MgBr + CH_3CH_2CH_2CH_2C{=}OCH_2CH_2CH_3 \longrightarrow$$

$$CH_3CH_3{-}C(\text{----}OMgBr)$$

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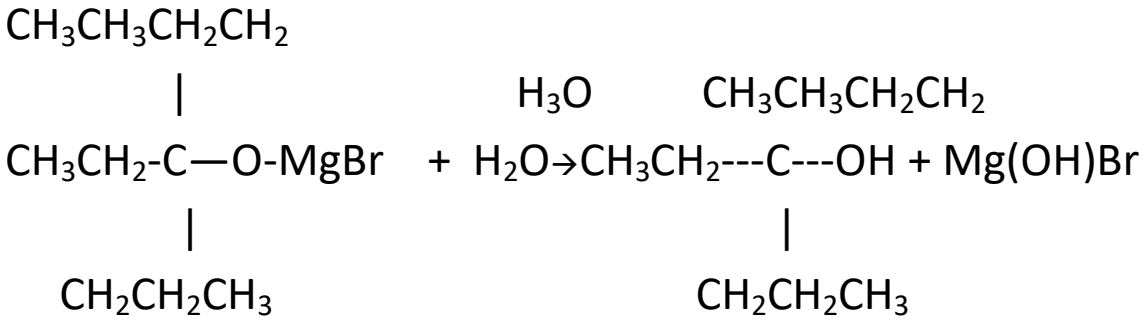
Hexane

Dilute is then added to this to hydrolyze it



Therefore an alcohol is formed.

C.INDUSTRIAL PRODUCTION OF ALCOHOLS

Production of ethanol

Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalyst enzyme found in yeast breaks down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on warming the malt to 60% for a specific period of time are converted into maltose by the diatase contained in the malt.

$2(C_6H_{10}O_5)_n + {}_nH_2O \text{ ---------} \rightarrow {}_nC_{12}H_{22}O_{11}$

Carbohydrate diatase maltose

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

$C_{12}H_{22}O_{11} + H_2O \text{ ---------} \rightarrow 2C_6H_{12}O_{16}$

Maltose 15%/maltase glucose

The enzyme at constant temperature of 15% is then converted into alcohol by the enzyme zymase contained also in yeast

$C_6H_{12}O_6\text{---------} \rightarrow 2CH_3CH_2OH + 2CO_2$

Glucose 15%/zymase ethanol

D. REDUCTION OF ALDEHYDE AND ALKANONE

Aldehyde and alkanone are reduced to primary and secondary alcohols respectively by reaction with hydrogen in the presence of a platinum catalyst or with aluminum isopropoxide (Meerwein-Ponndorf) or with

complex metal hydride, such as lithium tetrahydridoaluminate (III) ($LiALH_4$) or sodium tetrahydridoborate (III) ($NaBH_4$)

R\
R/ C=O----------→RCH_2OH(primary alcohol)
H_2(Ni or Pt)cat

R\
R/ C=O----------→RCH—R'
H_2(Ni or Pt) |
OH