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Course: Chem 102:

1.) Two major classification of alcohols and their examples are:

a) Classification based on the number of hydrogen atoms attached to the carbon atom containing the OH group.

Two examples are:

i) Methanol CH_3OH

ii) Propan-2-ol $CH_3(CHOH)CH_3$ (2°)

b) Classification based on the number of hydroxyl groups they possess.

Two examples are:

i) Monohydric alcohol - propanol $CH_3CH_2CH_2OH$

ii) Dihydric alcohol - Ethane-1,2-diol $HOCH_2-CH_2-OH$

2. Grignard synthesis of Alkanols

Grignard reagent $-C_2H_5MgBr$

$CH_3CH_2CH_2-C=O + CH_2CH_2CH_3 + C_2H_5MgBr \rightarrow C_4H_9 C_3H_7 C_2H_5$

$-C-OMgBr \longrightarrow C_4H_9 C_3H_7 C_2H_5 - C - OH + Mg(OH)Br$

3 Industrial manufacture 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 catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. On malting starch a malt to 60° for a specific period of time are converted into maltose by the e diastase contained in malt.

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

Carbohydrate — 60°C/diastase — Maltose

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

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

Maltose. — 15°C/maltase — Glucose

The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme zymase contained ~~also~~ also in yeast.

$$C_6H_{12}O_6 \xrightarrow[\text{Glucose}]{15^\circ C / \text{zymase}} \underset{\text{Ethanol}}{2CH_3CH_2OH} + 2CO_2$$

f. Alkanone Reduction of alkanone gives secondary alkanols

$$CH_3CH_5-C=O \xrightarrow[LiAlH_4]{} CH_3C_2CH_5CHOH \ (2^\circ) \text{alcohol}$$

Alkanals Reduction of alkanals gives primary alkanols!

$$CH_3CH_2CH=O \xrightarrow[LiAlH_4/H_2O]{} CH_3CH_2CH_2OH$$