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COURSE — CHM 102

DEPARTMENT — PHARMACY

ASSIGNMENT

1) Classification of Alcohols

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

i) If 2 or 3 hydrogen atoms are attached to the carbon atom bearing the OH group, it is called a primary alcohol (1°).

ii) If one hydrogen atom is attached to the carbon atom it is called a secondary alcohol (2°).

iii) If no hydrogen is attached to the carbon atom, it is a tertiary alcohol (3°).

Examples.

Methanol CH_3OH (1°)

propan-2-ol $CH_3CH(OH)CH_3$ (2°)

(B) Classification based on the number of hydroxyl groups they possess. Monohydric alcohol have one OH group present in the alcohol structure. Dihydric alcohols are called glycols, they have 2 hydroxyl group present in the structure while trihydric alcohols or triols have 3 OH groups present in the structure of the alcohol. polyhydric alcohols or polyols have more than 3 OH groups.

Examples

Monohydric alcohol — propanol $CH_3CH_2CH_2OH$

Dihydric alcohol — Ethane 1, 2 diol $HOCH_2-CH_2OH$

2) Grignard synthesis of Alkanols

Grignard reagent — C_2H_5MgBr

$CH_3CH_2CH_2CH_2-C=OCH_2CH_2CH_3 + C_2H_5MgBr \longrightarrow$

$C_4H_9C_3H_7C_2H_5-C-OMgBr \longrightarrow C_4H_9C_3H_7C_2H_5-C-OH$

$+ Mg(OH)Br$

3) Industrial manufacture of [illegible]

Carbohydrate such as starch are [illegible]

that can be made to yield ethanol [illegible]

The biological catalysts, enzymes fou[...]

molecules into ethanol to give [...]

On warming starch with malt [...]

are converted into maltose [...]

the malt.

$2(C_6H_{10}O_5)_n + nH_2$ [...]

Carbohydrate

The maltose is broken down [...]

contains the enzyme maltase and [...]

$C_{12}H_{22}O_{11} + H_2O \longrightarrow$ [...]

Maltose. 15°C/Malt[...]

The glucose at constant temperatu[re ...]

the enzyme zymase contained als[o ...]

$C_6H_{12}O_6 \longrightarrow 2CH_3CH_2O$[...]

Glucose. 15°C/zymase

4) Alkanone. Reduction of a[...]

$CH_3C_2H_5-C=O$ [...]

Li[...]

Alkanals. Reduction of alkana[...]

$CH_3CH_2CH=O$ — [...]

$LiAlH$[...]

3) Industrial manufacture of ~~Alkanol~~ Ethanol.

Carbohydrate 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~~ to break down the carbohydrate molecules into ethanol to give a yield of 95%.

On warming starch with malt to 60° for a specific period of time are converted into maltose by the enzyme diastase contained on the malt.

$$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow{60^\circ C/\text{diastase}} n(C_{12}H_{22}O_{11})$$

Carbohydrate — Maltose

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

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{15^\circ C/\text{Maltase}} 2C_6H_{12}O_6$$

Maltose — Glucose

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

$$C_6H_{12}O_6 \xrightarrow{15^\circ C/\text{zymase}} 2CH_3CH_2OH + 2CO_2$$

Glucose — Ethanol

4) Alkanone. Reduction of alkanone gives secondary alkanols

$$CH_3C_2H_5{-}C{=}O \xrightarrow{LiAlH_4} CH_3C_2H_5CHOH \ (2^\circ) \text{ alcohol}$$

Alkanals. Reduction of alkanals gives primary alkanols

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