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CHM 102 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, it is called a secondary

alcohol (2°).

iii. If no hydrogen atom is attached to the carbon atom, it is a

tertiary alcohol (3°).

Examples.

Methanol CH3OH (1°) Propan2ol CH3CH(OH)CH3 (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. Polydric alcohols or polyols have more than 3 OH groups.

Examples

Monohydric alcohol – Propanol CH3CH2CH2OH Dihydric alcohol – Ethane1,2diol HOCH2-CH2OH

2. Grignard synthesis ofAlkanols

Grignard reagent – C2H5MgBr CH3CH2CH2CH2-C=OCH2CH2CH3 + C2H5MgBr

C9H21 – C – OMgBr ———> C9H21 – C – OH + Mg(OH)Br

3. Industrial manufacture of 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 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 in the malt.

2(C6H10O5)n +nH2O. ——> n(C12H22O11) Carbohydrate 60°C / diastase. Maltose

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

C12H22O11 + H2O. ——–> 2C6H12O6 Maltose. 15°C / maltase. Glucose

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

C6H12O6. ———> 2CH3CH2OH + 2CO2 Glucose. 15°C / Zymase Ethanol

4. Alkanone:Reduction of alkanone gives secondary alkanols CH3C2H5-C=O ——–> CH3C2H5CHOH (2°) alcohol

LiAlH4

Alkanals: Reduction of alkanals gives primary alkanols.

CH3CH2CH=O ——–> CH3CH2CH2OH LiAlH4/ H2O