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Pharmacy

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CHM 102 Assignment

1. Classification of Alcohols
2. Classification based on the number of hydrogen atoms attached to the carbon atom containing the OH group
3. If two or three hydrogen atoms are attached to the carbon atom bearing the hydroxyl group, it is called a primary alcohol (1°).

Examples:

* CH3OH Methanol
* CH3CH2CH2OH Propan-1-ol

1. If one hydrogen atom is attached, it is called a secondary alcohol (2°). Examples:

* CH3CH(OH)CH3  Propan-2-ol
* CH3CH(OH)CH2CH3  Butan-2-ol

1. If no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is a tertiary alcohol (3°).

Examples:

* (CH3)3C-OH 2-methylpropan-2-ol
* 2-methylbutan-2-ol

1. Classification of alcohols based on the number of hydroxyl groups they possess
2. Monohydric alcohol has one OH group present in the alcohol structure. Examples:

* CH3CH2CH2OH Propanol
* CH3OH Methanol

1. Dihydric also called Glycols have two hydroxyl groups present in the alcohol structure. Examples

* HOCH2CH2OH Ethane-1,2-diol
* CH3CH(OH)CH2CH(OH)CH2OH Hexane-2,4-diol

1. Trihydric alcohols or triols have 3 OH groups present in the structure of the alcohol. Examples:

* OHCH2CH(OH)CH2OH Propane-1,2,3-triol
* Butane-1,2,3-triol

1. Polyhydric alcohols or polyols have more than 3 hydroxyl groups. Examples:

* Glycerol - H2C(OH)-CH(OH)-CH2OH CH3CH(OH)CH(OH)CH(OH)CH(OH)CH(OH)CH3 Heptane-2,3,4,5,6-pentaol

1. Grignard synthesis of Alkanols

Grignard reagent – C2H5MgBr

CH3CH2CH2CH2-C=OCH2CH2CH3 + C2H5MgBr → C4H9C3H7C2H5-C-OMgBr → C4H9C3H7C2H5-C-OH + Mg(OH)Br

1. Industrial manufacture of Ethanol

Carbohydrates such as starch are major groups 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 molecule into ethanol to yield of 95%. On warming starch with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.

2(C6H10O5)2 + nH2O -----------------→ nC12H22O11

Carbohydrate 60°C/diastase Maltose

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

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 the yeast

C6H12O6  --------------→ 2CH3CH2OH + 2CO2

Glucose 15°C/Zymase Ethanol

1. Alkanones: Reduction of Alkanones give secondary alkanols

(CH3)2CO --------------→ (CH3)2CHOH (2° alcohol)

H2O

Alkanals: Reduction of Alkanals gives primary alkanols

CH3CH2CHO --------------→ CH3CH2CH2OH (1° alcohol)

LiAlH4