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COLLEGE OF MEDICINE AND HEALTH SCIENCES

MEDICINE AND SURGERY

CHEM 102

MATRIC NO: 19/MHS01/032

100 LEVEL.

**ASSIGNMENT**

1. Discuss the two major classification of Alkanols. Give two examples each for each class.
2. Alkanols can be classified based on the number of hydrogen atoms attached to the carbon 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 (1°).** If it is one hydrogen atom, it is called **secondary alcohol (2°)** and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a **tertiary alcohol (3°)**. Examples are; CH3OH Methanol (1°), (CH3)3C-OH 2-Methylpropan-2-ol (3°).
3. Alkanols can be classified based on the number of hydroxyl groups they possess. **Monohydric alcohols** have one hydroxyl group present in their alcohol structure. **Dihydric alcohols** are also called **Glycols** have two hydroxyl groups present in their alcohol structure while **Trihydric alcohols or triols** have three hydroxyl groups present in the structure of the alcohol. **Polyhydric alcohols or polyols** have more than three hydroxyl groups. Examples are; CH3CH(OH)CH(OH)CH(OH)CH(OH)CH(OH)CH3 (Heptane-2,3,4,5,6-pentaol), 2
4. In the Grignard synthesis of Alkanols, react a named Grignard reagent with CH3CH2CH2CH2C=OCH2CH2CH3. Show the reaction steps.

**REACTION**

Let the named Grignard reagent be **Butylmagnesiumbromide**; CH3CH2CH2CH2MgBr

**STEPS:** CH3CH2CH2CH2MgBr + CH3CH2CH2CH2-C=O

 CH3CH2CH2

 CH3CH2CH2CH2

 CH3CH2CH2CH2-C-OMgBr

 CH3CH2CH2

 **HYDROLYSIS(H+OH-)**

 CH3CH2CH2CH2

 CH3CH2CH2CH2-C-OH + Mg(OH)Br

 CH3CH2CH2

1. Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction.

**INDUSTRIAL MANUFACTURE OF ETHANOL**

Ethanol is produced industrially by the biological process of fermentation. Carbohydrates such as starch are a major group of natural compounds that can be made to yield ethanol by the process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%.

**STEP 1**: The starch containing materials include molasses, potatoes, cereals, rice and on warming 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)n  + nH2O nC12H22O11

 Carbohydrate 60°C/diastase Maltose

**STEP 2**: The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C.

C12H22O11 + H2O 2C6H12O6

Maltose 15°C/maltase Glucose

**STEP 3**: 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

1. Determine the product obtained in the reduction of alkanone and alkanal. Use a specific example for each and show the equation of reaction.

REDUCTION OF ALKANONE AND ALKANAL

In the reduction of alkanones also known as ketones a **Secondary alcohol** is obtained.

RR’C=O RR’ CHOH

KETONE LiAlH4/(C2H5)2O SECONDARY ALLCOHOL

In the reduction of alkanals also known as aldehydes a **Primary alcohol** is obtained.

ALDEHYDE PRIMARY ALCOHOL

RCHO RCH2OH

 LiAlH4/(C2H5)2O

EXAMPLE;

