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**COURSE CODE: CHM102**

**DEPARTMENT:NURSING**

***Assignment***

1. **Discuss the two major classification of alkanols. Give two examples each for each class.**

* **This is 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 three or two, it is called a primary alcohol (1°). If its 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: CH3CHOH Ethanol (1°), CH3CH(OH)CH3 Propan-2-ol(2°)**

* **This is based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called Glycols, have two hydroxyl groups present in the alcohol structure while the 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: HOCH2CH2OH Ethane-1,2-diol(Dihydric alcohol). CH3CH2OH Propanol (monohydric alcohol)**

1. **In the Grignard synthesis of alkanols, react a named Grignard reagent with CH3CH2CHCH2C=OCH2CH2CH3. Show the reaction steps.**

**O**

**II**

**CH3MgBr+CH3CH2CH2CH2CCH2CH2CH3 CH3**

**(Grignard reagent) (octan-4-ol) I**

**Mg(Br)Cl+CH3CH2CH2CH2-C-CH2CH2CH3**

**I**

**OH**

**Tertiary alkanol.**

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

**PRODUCTION 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 breakdown the carbohydrate molecules into ethanol to give a yield of 95%. 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 malt.**

* **THE BREAKDOWN OF CARBOHYDATE**

**2(C6H10O5)+nH20------------------🡪nC12H22O11**

**Carbohydrate 60°C/Diastase Maltose**

* **BREAKDOWN OF MALTOSE**

**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**

* **CONVERSION OF GLUCOSE TO ETHANOL**

**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.**

**Both alkanals and alkanones can undergo reduction using hydrogen atom (H) to the carbon of the carbonyl functional group and to the oxygen present in the carbonyl functional group(C=O) to produce a new functional group, the hydroxyl group (OH)**

**REDUCTION OF ALKANONE: Alkanones are reduced to the corresponding secondary alkanol.**

**Conc.H2SO4**

**CH3-CH2-CH2-OH-------------------------🡪CH3-CH=CH2**

**Propan-1-ol 170°C(-H20) Prop-1-ene**

**HBr**

**CH3-CH=CH2-------------------------------**🡪**CH3-CH-CH3**

**I**

Br 2Bromopropane

KOH(aq)

CH3-CH-CH3----------------🡪CH3-CH-CH3

I I

Br OH Propan-2-ol

REDUCTION OF ALKANAL: Alkanals are reduced to the corresponding primary alkanol by reducing agents such as lithium tetrahydridoaluminate(III)(LiAlH4)

E.G. Ethanal is reduced to ethanol

O OH

II II

CH3-C-H+2(H)-----------------------🡪CH3-CH2

Ethanal Ethanol