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**MATRIC** **NO**: **19**/ENG05/057

**DEPARTMENT**: **Mechatronics**

**COURSE**: **CHM** **102**

**ASSIGNMENT**

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

CLASSIFICATION 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 (10). If it is one hydrogen atom it is called secondary alcohol (20). If no hydrogen atom is attached to the carbon atom nearing the hydroxyl group, it is called a tertiary alcohol (30).

Examples: CH3OH Methanol (10) CH3CH2OH Ethanol (10)

CLASSIFICATION 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 Trihydric alcohols or Triols have three hydrocyl groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups’

Examples: CH3CH2CH2OH Propanol (Monohydric alcohol)

HOCH2CH2OH Ethane-1,2-diol ( Dihydric alcohol)

1. In the Grignard synthesis of alcohols react a named grignard reagent with CH3CH2CH2C=OCH2CH2CH3. Show the reaction steps.

NAMED GRIGNARD REAGENT : CH3MgBr

1.CH3MgBr+CH3CH2CH2C=OCH2CH2CH3 🡪  CH3CH2CH2

I

CH3—C—OmgBr

I

CH3CH2CH2

2. CH3CH2CH2 CH3CH2CH2

I dil acid I

CH3—C—OmgBr ---------> CH3—C—OH+ Mg (OH) Br

I H+OH-

CH3CH2CH2

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

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 enzymez found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95 percent. The starch containing materials including molasses, potatoes, cereals, rice and on warming with malt to 600C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.

2(C6H10O5)n+nH2O------------------> nC12H22O11

Carbohydrate 600C/ diastase maltose

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 150C

C12H22O11+H2o ----------------------> 2C6H12O6

Maltose 150C/maltase glucose

The glucose at constant temperature of 150C is then converted into alcohol by the enzyme zymase contained also in yeast

C6H12O6 -------------------> 2CH­3CH2CH20H + 2CO2

Glucose 150C/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.

THE REDUCTION OF ALKANALS

Using lithium tetrahydridoaluminate or sodium tetrahydridoborate

Reduction of Ethanal to get Ethanol

O OH

II I

CH3—C—H +2[H] --------------> CH­3—C—H

Primary alcohols: CH3CH2OH. In general terms the reduction of an aldehyde leads to primary alcohol.

THE REDUCTION OF ALKANONE

Using lithium tetrahydridoaluminate or sodium tetrahydridoborate

Reduction of propanone to get propan-2-ol

CH3  OH

I I

C=0 + 2[H] ----------------> CH3—C—H

I I

CH3 CH3

Secondary alcohols: CH3CHCH3

I

OH

In general terms the reduction of an aldehyde leads to secondary alcohols.