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MATRIC NO: 19/MHS02/036

DEPARTMENT: NURSING

COURSE CODE: CHEM102 ASSIGNMENT

QUESTION1

Give two major classification of Alkanols. Give two examples each for each class.

Answer

Primary Alkanol: It has one alkyl group attached to the carbon atom that carries the hydroxyl group. Examples are, Ethanol (CH_3CH_2OH), Methanol (CH_3OH).

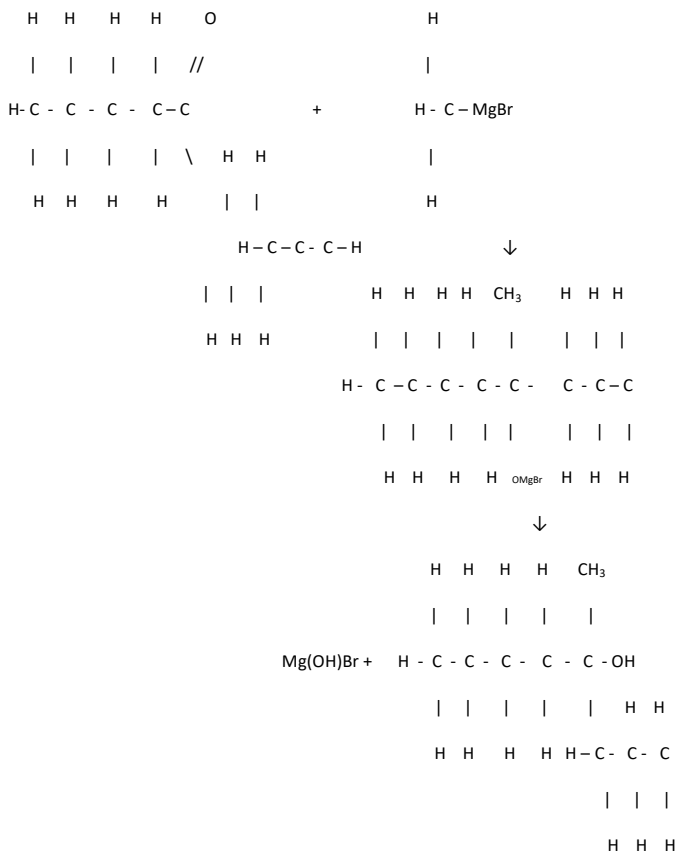
Secondary Alkanol: it has two alkyl groups attached to the carbon atom that carries the hydroxyl group. Examples are, Propan-2-ol ($CH_3CH(OH)CH_3$), Butan-2-ol ($CH_3CH(OH)CH_2CH_2$)

QUESTION2

In the Grignard synthesis of Alkanols, react a named Grignard reagent with $CH_3CH_2CH_2CH_2C{=}OCH_2CH_2CH_3$

Answer

Grignard Reagent: CH_3MgBr(Methyl magnesium bromide)



QUESTION 3

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

Answer

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 break down 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 60^0C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.

$2(C_6H_{10}O_5)n + nH_2O \rightarrow nC_{12}H_{22}O_{11}$

Carbohydrate 60^0C/diastase maltose

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15^0C.

$C_{12}H_{22}O_{11} + H_20 \rightarrow 2C_6H_{12}O_6$

Maltose 15^0C/maltase glucose

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

$C_6H_{12}O_6 \rightarrow 2CH_3CH_2OH + 2CO_2$

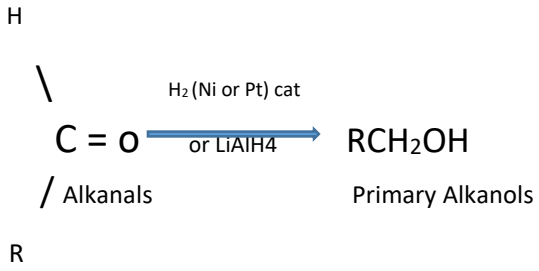
Glucose 15^0C/zymase Ethanol

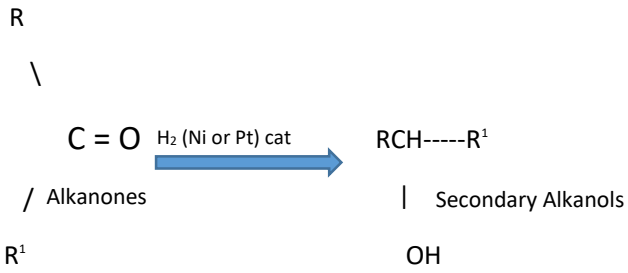
Question4

Determine the product obtained in the reduction of Alkanone and Alkanal. Use a specific example for each and show the equation of reaction.

Answer

Alkanals and alkanones are reduced to primary and secondary Alkanols respectively by reaction with hydrogen in the presence of a platinum or nickel catalyst or with aluminum isopropoxidede (the Meerwein- Ponndorf reaction) or with complex metal hydride, such as Lithium tetrahydridoaluminate III($LiAlH_4$) or Sodium tetrahydridoborate III





Specific Examples