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MATRIC NO: 19/MHS02/108

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

ANSWER

a. CLASSIFICATION BASED ON NUMBER OF HYDROGEN ATOMS ATTACHED TO CARBON ATOMS: If the numbers of hydrogen attached to the carbon atom bearing the hydroxyl group are two or three, it is called a primary alchohol(1°), . If it is one hydrogen atom, it is called secondary alchohol(2°). and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a tertiary alchohol(3°).

Examples:CH3CH2CH2CH2OH(Butanol(1°), CH3CH(OH)CH3 Propan-2-ol(2°)

b. CLASSIFICATION BASED ON THE NUMBER OF HYDROXYL GROUPS THEY POSSESS: Monohydric alchohols have one hydroxyl group present in the alchohol structure. Dihydric alchohols have two hydroxyl groups present in the alchohol structure while trihydric alchohols have three hydroxyl groups present in the structure of the alchohol. Polyhydric alchohols have more than three hydroxyl groups.

Examples: CH3CH2CH2OH Propanol(Monohydric alchohol), OHCH2CH2OH Ethane-1,2-diol (dihydric alchohol)

2. In the Grignard synthesis of Alkanols, react a named Grignard reagent with CH3CH2CH2CH2C=OCH2CH2CH3. Show the reaction steps.

ANSWER

Grignard reagent used: CH3CH2MgCl (Ethyl Magnesium Chloride)

 CH3CH2MgCl+CH3CH2CH2CH2C=OCH2CH2CH3------------->CH3CH2CH3CH2CH2CH2CH2CH2CH3C-OMgCl--------->CH3CH2CH3CH2CH2CH2CH2CH2CH3C-OH + Mg(OH)Cl H+OH-

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

ANSWER

Starch containing material including rice, Yam etc on warming with malt to 60°c for a specific period of time are converted into maltose by the enzyme diastase contained in malt.

2(C6H12O5)n + nH2O--------------------> nC12H22O11

Carbohydrate 60°c/ diastase 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

The glucose at constant temperature of 15°c is then converted into alchohol by the enzyme zymase contained in yeast.

C6H12O6------------------------> 2CH3CH2OH + 2CO2

Gluose 15°c/ zymase Ethanol

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

**ANSWER**

Alkanone

Alkanones are reduced to secondary alchohols. For example, propanone is reduced to propan-2-ol.

 LiAlH4

Equation: CH3COCH3-----------------> CH3CHOHCH3

 H2O

 ALKANALS Alkanals are reduced to primary alchohols. For example, ethanal is reduced to ethanol

 LiAlH4

Equation: CH3CHO-------------------> CH3CH2OH

H2O