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COLLEGE: MHS

DEPARTMENT: NURSING SCIENCE

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

ANSWER

1. The first classification is based on the number of hydrogen atoms attached to the carbon atoms 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 primary alcohol. If it is only one hydrogen atom it is called secondary alkanol and if there is no hydrogen atom attached to the carbon bearing the hydroxyl group, it is called tertiary alkanol. Examples are: $CH\_{3}OH$ (methanol, a primary alcohol) and $CH\_{3}CH\left(OH\right)CH\_{3}$(propan\_2\_ol, which is a secondary alkanol).
2. The second classification is based on the number of hydroxyl group they possess. Monohydric alcohols have only one hydroxyl group, Dihydric alcohols have two hydroxyl group, trihydric alcohols have three hydroxyl group and poly hydroxyl alcohol have more than three hydroxyl groups. Examples are: propanol$(CH\_{3}CH\_{2}CH\_{2}OH$), it is a monohydric alcohol and ethane\_1,2\_diol($HOCH\_{2}CH\_{2}OH)$, it is a dihydric alcohol.

2)In the Grignard synthesis of alaknols, react a named Grignard reagent with$ CH\_{3}CH\_{2}CH\_{2}CH\_{2}C=OCH\_{2}CH\_{2}CH\_{3}$. Show the reaction steps.

ANSWER

CH3CH2CH2CH2C=OCH2CH2CH3+CH3CH2MgCl→CH3CH2CH2CH2C(CH3CH2CH2)(CH3CH2)(OMgCl)$→$CH3CH2CH2CH2−C(CH3CH2CH2)(CH3CH2)(OH)+Mg(OH)Cl.

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

A. The starch containing materials like potatoes and rice is warmed with malt to 60$℃$ and it becomes converted into maltose by the enzyme diastase present in the malt.

ANSWER

$$2\left(C\_{6}H\_{10}O\_{5}\right)n+H\_{2}O→nC\_{12}H\_{22}O\_{11}$$

 (Carbohydrate) (maltose)

1. The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase at a temperature of 15$℃$.

 $C\_{12}H\_{22}O\_{11}+H\_{2}O→nC\_{12}H\_{22}O\_{11}$

(Maltose) (Glucose)

1. The glucose at constant temperature of 15$℃$ is then converted into ethanol by the enzyme zymase gotten from yeast

$$C\_{6}H\_{12}O\_{6}→2CH\_{3}CH\_{2}OH+CO\_{2}$$

 (Glucose) (Ethanol)

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

ANSWER

Aldehyde is reduced to primary alkanol by reacting with reducing agent like lithiumtetrahydridoaluminate(iii) in etoxyethane ($LiAl\_{4}/\left(C\_{2}H\_{5}\right)\_{2}O)$.

$$CH\_{3}CHO→CH\_{3}CH\_{2}OH$$

 (Ethanal) (Ethanol)

1. Alkanone is reduced to secondary alkanol by reacting with a reducing agent like lithiumtetrahydridoaluminate(iii) in ethoxyethane ($LiAlH\_{4}/\left(C\_{2}H\_{5}\right)\_{2}O).$

$$\left(CH\_{3}\right)\_{2}C=O→CH\_{3}CH\left(OH\right)CH\_{3}$$

 (Propanone) (Propan\_2\_ol)