NAME [illegible]

MBBS

19/[illegible]

CHM 102

ASSIGNMENT

1. Discuss the four(4) major classification of Alcohols. Give 2 examples each for each class.

Answer

a. 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 it is one hydrogen atom, it is called a 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

i. Ethanol – CH_3CH_2OH (1°)

ii. 2-Methylpropan-2-ol – $(CH_3)_3C-OH$ (3°)

b. 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, they have 2 hydroxyl groups present in the alcohol structure while trihydric alcohols have 3 hydroxyl groups present in the structure of the alcohol and polyhydric alcohols have more than 3 hydroxyl groups. Examples (i) Propanol – $CH_3CH_2CH_2OH$ (monohydric) (ii) Propane-1,2,3-triol – $CH_2OHCH(OH)CH_2OH$ (trihydric)

2 [illegible] the Grignard synthesis of alcohols, [illegible] Grignard reagent [illegible]
[illegible]

Let Grignard reagent be $CH_3CH_2CH_2MgBr$
(Propyl magnesium bromide)

$CH_3CH_2\overset{\delta^-}{CH_2}\overset{\delta^+}{Mg}Br + CH_3CH_2CH_2CH_2-C=O$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad |$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad CH_2CH_2CH_3$

Propyl magnesium Bromide ↓ Octan-4-one

$CH_3CH_2CH_2$
$CH_3CH_2CH_2CH_2-C-OMgBr \xrightarrow{H^+/H_2O} CH_3CH_2CH_2CH_2-C-OH$ (with $CH_3CH_2CH_2$ above and $CH_2CH_2CH_3$ below)
$CH_2CH_2CH_3$ + $Mg(OH)Br$

The reaction would give
$CH_3CH_2CH_2CH_2-C(CH_2CH_2CH_3)(CH_2CH_2CH_3)-OH + Mg(OH)Br$

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

STEP I
The starch containing materials [illegible] [illegible] will be 60°C for a specific period of time to converted into maltose by the enzyme diastase [illegible] in the malt

$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow{60°C/\text{diastase}} nC_{12}H_{22}O_{11}$
[illegible] maltose

STEP II

The maltose is broken down into glucose on addition of yeast which contains the enzymes maltase at a temperature of 15°C

$$C_{12}H_{22}O_{11} \xrightarrow[15°C/\text{Enzymes}]{+H_2O} 2C_6H_{12}O_6$$

Maltose — Glucose

STEP III

The glucose at another temperature of 15°C in the presence of ethanol by the enzyme zymase produces also is yeast

$$C_6H_{12}O_6 \xrightarrow{15°C/\text{Zymase}} 2CH_3CH_2OH + 2CO_2$$

Glucose — Ethanol

4) Determine the product obtained in the reduction of Alkanone and Alkenal-use a specific example for each to illustrate the equation of reaction

Product for reduction of an Alkenone => secondary alcohol

Product for reduction of Alkenal => Primary alcohol

Eg a) $H-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\overset{O}{\overset{\|}{C}}-H \xrightarrow{H_2O/LiAlH_4}$ $H-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-OH$

Hexanal — Hexanol

Eg b) $H-\underset{H}{\overset{H}{C}}-\overset{O}{\overset{\|}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-H \xrightarrow{H_2O/LiAlH_4}$ $H-\underset{H}{\overset{H}{C}}-\underset{OH}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-H$

Hexa-2-one — Hexa-2-ol