ABUBALUEZE GOODNESS EBELE
19/MHS01/101
CHEMISTRY ASSIGNMENT

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

(1) This is based on the number of hydrogen atoms attached to the carbon atom containg the hydroxyl group:-
It is classified into three
1. Primary ~~alcohol~~ alcohol (1°) 2. Secondary alchol (2°) 3. Tertiary alchol (3°)

① Primary alcohol: This is when the carbon bearing the hydroxyl group has two or three hydrogen atoms attached

② Secondary alchol:- This is when the carbon bearing the hydroxyl group has one hydrogen atom attached

3. Tertiary alchol:- This is when the carbon bearing the hydrogeyl group has no atom attached

Eg:- CH_3OH Methanol (1°) CH_3CH_2OH Ethanol (1°)

(2) This is based on the number of hydroxyl groups they possess: Mono-hydric alchols have one hydroxyl group ryent, dihydric (glycol) has two hydroxyl groups prent which trihydric alchols (triols) has three. Polyhydric alchols (Polyols) have more than three OH group

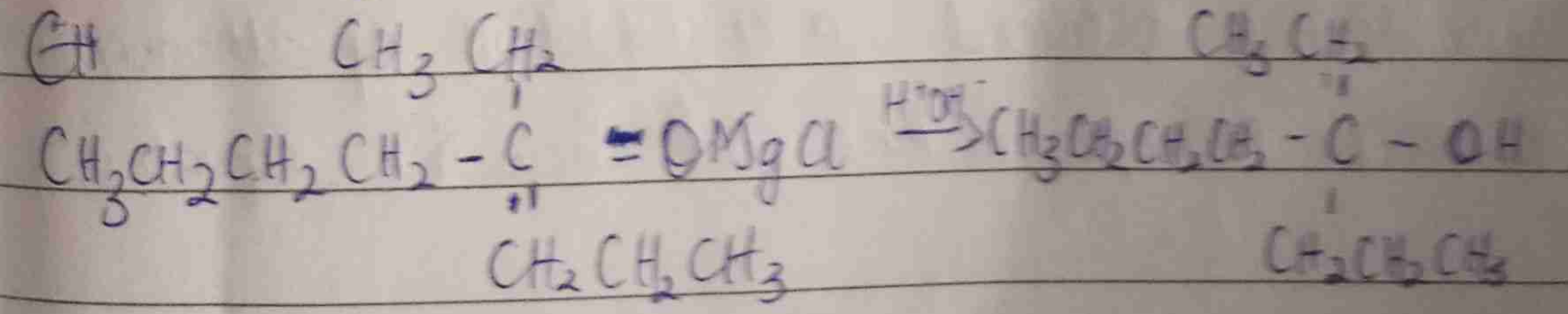
$CH_3CH_2CH_2OH$ propanol (Monohydric alchol)

$HOCH_2CH_2OH$ Ethane-1,2-diol (Dihydric alcohol)

2. In the Grignard synthesis of Alcohols react a named Grignard reagent with $CH_3CH_2CH_2CH_2C{=}OCH_2CH_2CH_3$

Grignard reagent = CH_3CH_2MgCl (Ethyl magnesium chloride)

$$CH_3CH_2MgCl + CH_3CH_2CH_2CH_2C{=}OCH_2CH_2CH_3 \longrightarrow$$



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

Starch are major group of natural compounds that yield ethanol by fermentation. The biological catalysts break down the carbohydrate molecules into ethanol to give 95% yield.

* Starch containing materials like cereals are warmed with malt to 65°c for a specific period of time. It is then converted to maltase by the enzyme diastase containing malt

$$2H_2O + 2(C_6H_{10}O_5)_n + nH_2O \xrightarrow[60^\circ C/\text{diastase}]{} nC_{12}H_{22}O_{11}$$

Starch water maltose

* The maltose is then broken down to glucose by adding yeast which contains enzyme maltase. It is done at a temperature of 15°c

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{15^\circ C/\text{maltase}} 2C_6H_{12}O_6$$

Maltose water glucose

* Glucose is then converted to alchol at a constant temperature of 15°c by an enzyme Zymase which is found in yeast

$$C_6H_{12}O_6 \xrightarrow{15^\circ C/\text{zymase}} 2CH_3CH_2OH + 2CO_2\uparrow$$

Ethanol Carbon IV oxide

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

Solution

Using Meerwein-Ponndorf reaction

Alkanal

$CH_3CH_2CH_2 \diagdown C=O$ (H) $\xrightarrow{H_2(Ni \text{ or } Pt) \text{ cat}}$ $CH_3CH_2CH_2CH_2OH$

Butanal

Butanol

Alkanone

$CH_3CH_2CH_2 \diagdown C=O$ (CH_3CH_2) $\xrightarrow{H_2(Ni \text{ or } Pt) \text{ cat}}$ $CH_3CH_2CH_2-\underset{OH}{CH}-CH_2CH_3$

Hexan-3-one

Hexan-3-ol