ESSIEN BLESSING EKENG

19/MHS11/053

Pharmacy

1. Classification of Alcohols
    A. Classification based on the number of hydrogen atoms attached to the carbon atom containing the OH group
        i. If 2 or 3 hydrogen atoms are attached to the carbon atom bearing the OH group, it is called a primary alcohol(1°).
        ii. If one hydrogen atom is attached, it is called a secondary alcohol (2°).
        iii. If no hydrogen atom is attached to the carbon atom, it is a tertiary alcohol (3°).

    Examples.

    Methanol CH3OH (1°)

    Propan2ol CH3CH(OH)CH3 (2°)

    B. Classification based on the number of hydroxyl groups they possess. Monohydric alcohol have one OH group present in the alcohol structure. Dihydric alcohols are called glycols, they have 2 hydroxyl group present in the structure while trihydric alcohols or triols have 3 OH groups present in the structure of the alcohol. Polydric alcohols or polyols have more than 3 OH groups.

    Examples

    Monohydric alcohol – Propanol CH3CH2CH2OH

    Dihydric alcohol – Ethane1,2diol HOCH2-CH2OH
2. Solubility of alcohols in water and organic solvents
    Alcohols are soluble in water. This is due to the hydroxyl group in the alcohol which is able to form hydrogen bons with water molecules. Alcohols with a smaller hydrocarbon chain are very soluble. As the length of the hydrocarbon chain increases, the solubility in water decreases.. The reason why the solubility decreases as the length of hydrocarbon chain increases is because it is requires more energy to overcome the hydrogen bonds between the alcohol molecules as the molecules are more tightly packed together as the size and mass increases. Generally, non polar solutes are soluble in non polar solvents. Alcohol is soluble in organic sovlents.
3. Industrial manufacturer of Ethanol
    Carbohydrate 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%. On warming starch with malt to 60° for a specific perio6of time are converted into maltose by the enzyme diastase contained in the malt.

$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow{60°C / \text{diastase}} n(C_{12}H_{22}O_{11})$
Carbohydrate Maltose

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

$C_{12}H_{22}O_{11} + H_2O \xrightarrow{15°C / \text{maltase}} 2C_6H_{12}O_6$
Maltose. Glucose

The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast

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

4. $(CH_3)_2CHCH{=}O + C_4H_9MgCl \longrightarrow C_4H_9CH(CH_3)_2CH\text{-}OMgCl$

$+ H_2O$
Dilute acid

$C_4H_9CH(CH_3)_2CH\text{-}OH + MgClOH$

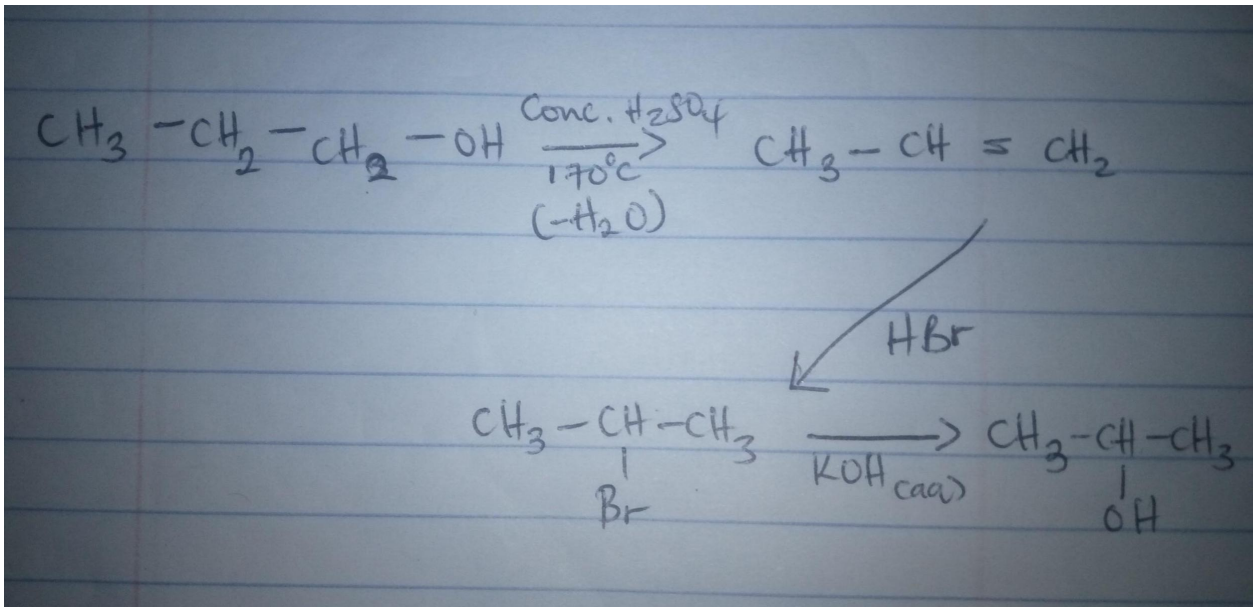
5. $(CH_3)_2CH_2C{=}O + C_4H_9MgCl \longrightarrow C_4H_9(CH_3)_2C\text{-}OMgCl \xrightarrow{H_2O, \text{ dilute acid}}$

$C_4H_9CH_2(CH_3)_2C\text{-}OH + MgClOH$

6. $(CH_3)_2CHCH{=}O \longrightarrow (CH_3)_2CHCH_2OH$
   2methyl propanal
7. $(CH_3)_2CH_2C{=}O \longrightarrow (CH_3)_2CH_2CH\text{-}OH$
   2methyl propanone

8. CH3-CH2-CH2-OH (propan-1-ol)
   Heat in the presence of concentrated H_2SO_4 ,to dehydrate it and form propene $(CH_2{=}CH\text{-}CH_3)_2$
   $CH_3\text{-}CH_2\text{-}CH_2\text{-}OH \longrightarrow CH_2{=}CH\text{-}CH_3$ (after heating with concentrated H_2SO_4)

Now to propene add water (you may use mercuric acetate as it favours Markownikoff addition)
$CH_3\text{-}CH{=}CH_2 + H_2O = CH_3\text{-}CH(OH)\text{-}CH_3$ (propan-2-ol)


CH3 – CH2 – CH2 – OH
Conc. H2SO4
170°C
(–H2O)
CH3 – CH = CH2
HBr
CH3 – CH – CH3
Br
KOH (aq)
CH3 – CH – CH3
OH