Name: Ayoade Miqdad
Matric No: 19/mhs01/110

1) Classification of Alcohols

a) Based on number of hydrogen atoms:

(i) Primary alcohol: The number of hydrogen atoms attached to the hydroxyl group are either 2 or 3. e.g Methanol (CH_3OH).

(ii) Secondary alcohol: If only one hydrogen atom is attached to the hydroxyl group. e.g (Propan-2-ol) $CH_3CH(OH)CH_3$

iii) Tertiary alcohol: When no hydrogen atom is attached to the hydroxyll group. (2Methyl Propan-2-ol) $(CH_3)_3C-OH$

Examples:

Solubility in water

2) Alcohols are soluble in water due to the hydroxyl group in the alcohol which is able to form hydrogen bond with water molecules. As the length of the hydrocarbon chain increases the solubility in water decreases

Solubility in organic solvent

The non Polar alkyl group enables alcohol to interact with non Polar organic molecules

3) Industrial Production of Alcohol:

i) Carbohydrates can be made to yield ethanol by fermentation. Carbohydrate substances such as potato or rice are warmed with malt at 60°C for a period of time before they are converted maltose by enzyme diastase in the malt.

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

carbohydrate — maltose

ii) The maltose is broken down to glucose on addition of yeast which contains the enzyme maltase at a temperature of 15°C

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

iii) The glucose at a constant temperature of 15°C is then converted into alcohol by the enzyme zymase contained in the yeast

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

Glucose — Ethanol

6. $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{H}{|}}{C}}-\overset{\overset{H}{|}}{C}=O + C_4H_9MgCl$

$\xrightarrow{HCl,\ H^+}$

$C_4H_9-\overset{\overset{C_3H_7}{|}}{C}-OH + Mg(OH)Cl$

7) $C_2H_5\underset{\underset{H}{|}}{C}=O \xrightarrow[LiAlH_4]{+2[H]} C_3H_7OH$

8) Conversion of Propan-1-ol to Propan-2-ol: This could be done by dehydration.

$CH_3-CH_2-CH_2-OH$ (Propan-1-ol)

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