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(1) Alcohols are very important Organic compounds Discuss briefly their classifications and give one example each

CLASSIFICATION OF ALCOHOLS

(a) This is a based On the number of hydrogen atoms attached to the Carbon atom containing the hydroxyl group. If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl are three or two it is called primary alcohol (1°). If it is one hydrogen atom it is called 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 are CH_3OH Methanol, CH_3CH_2OH (Ethanol) (1°) & etc

(b) This is based on the number of hydroxyl group they possess. Monohydric alcohols has one hydroxyl group present in the alcohol Structure. Dihydric Alcohols are also called glycols have two hydroxyl groups present in the alcohol structure while TRIHYDRIC ALCOHOLS or TRIOLS have three Hydroxyl groups present in the structure of the alcohol. POLYHYDRIC ALCOHOLS have more than one three hydroxyl groups. Example are: $CH_3CH_2CH_2OH$ propanol (Monohydric alcohol)

(2) Discuss the solubility of alcohols in water, Organic Solvent water

alcohols. Upto to three Carbon atoms Member molecules are soluble water because, these low alcohols can form hydrogen bond with water molecules. The water solubility alcohols decreases with increasing relative molecular mass.

All monohydric alcohols are soluble in Organic solvents. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with water molecules

(3) Outline 3 steps in the industrial manufacture of ethanol. Equations of reaction are necessary

The starch containing materials include molasses, potatoes, corn, rice and barley which are converted into maltose by the enzyme diastase contained in the malt

$$2(C_6H_{10}O_5) + nH_2O \xrightarrow{\text{diastase}} nC_{12}H_{22}O_{11}$$
starch → maltose

The maltose is broken down into glucose at a temperature of 15°C when contains the enzyme maltase and at a temperature of 15°C is then converted into alcohol by the enzyme zymase contained in yeast

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{maltase}} 2C_6H_{12}O_6$$
maltose → glucose

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

$$C_6H_{12}O_6 \xrightarrow{\text{zymase}} 2CH_3CH_2OH + 2CO_2$$

(4) Show the reaction between 2-methylpropanal and butyl magnesium chloride - GRIGNARD SYNTHESIS

$$C_4H_9MgCl(aq) + (CH_3)_2CHCH \longrightarrow P(CH_3)_2CH(OH)CH(CH_3)CH_2CH_2CH_3$$
CH_3

(5) Show the reduction reaction of 2-Methyl propanal

$$H_3C-\underset{CH_3}{CH}-\underset{O}{C}-H \xrightarrow[H_3O^+]{NaBH_4} H_3C-CH-\underset{H}{\overset{OH}{C}}-H$$
2 methyl propanal → 2 methyl propanol

(6) Propose a scheme for the conversion of propan-1-ol to propan-2-ol

$$CH_3CH_2CH_2OH + H_2SO_4 \longrightarrow CH_3CH_2CH_2CH_2OSO_3H \xrightarrow{-H_2O} CH_3CH_2CH_2OSO_3H \xrightarrow{-H_2SO_4} CH_3=CH_2 \xrightarrow{H_2O} CH_3-\underset{OH}{CH}-CH_3$$