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DEPARTMENT: PHARMACY
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1)a) This is based on the number of ~~groups~~ hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atom attached to the carbon atom bearing the hydroxy group are ~~one~~, three or two, it is called primary alcohol, one is called secondary alcohol, zero is called tertiary alcohol. eg CH_3OH (Methanol) (1°)

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 because of the two hydroxyl groups present in the alcohol structure. Trihydric have three hydroxyl groups present in the alcohol structure.

2a) In water:

Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The solubility of alcohols

b) Organic solvents:

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 molecule.

3a) The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to 60°c for a specific period of time are converted into maltose by an enzyme diatase contained in the malt.

$$2(C_6H_{10}O_5)_n + nH_2O \longrightarrow nC_{12}H_{22}O_{11}$$

carbohydrate — 60°c/diastase — maltose

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

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow 2C_6H_{12}O_6$$

maltose — 15°c/maltase — glucose

c) The glucose at constant temperature of 15°c is then converted into alcohol by the enzyme

Zymase contained also in yeast

$C_6H_2O_6 \longrightarrow 2CH_3CH_2OH + 2CO_2$

Glucose — 15°c/zymase — Ethanol

4) $(CH_3)_2CHCH=O + C_4H_9MgCl \longrightarrow C_4H_9CH(CH_3)_2CH+OMgCl$

$\downarrow +H_2O$ Dilute acid

$C_4H_9CH(CH_3)_2CH-OH$

$+ MgClOH$

5) $(CH_3)_2CH_2C=O + C_4H_9MgCl \longrightarrow C_4H_9(CH_3)_2C-OMgCl \rightarrow$

H_2O, dilute acid

$C_4H_9CH_2(CH_3)2C-OH + MgClOH$

6) $(CH_3)_2CHCH=O \longrightarrow (CH_3)_2CHCH_2OH$

2 methyl propanol

7) $(CH_3)_2CH_2C=O \longrightarrow (CH_3)_2CH_2CH-OH$

2 methyl propanone

8) $CH_3 - CH_2 - CH_2 - OH$ (propan-1-ol)

Heat in the presence of concentrated H_2SO_4, to dehydrate it and form propene ($CH_2 = CH - CH_3$)

$$CH_3 - CH_2 - CH_2 - OH \rightarrow CH_2 = CH - CH_3$$

(after heating with concentrated H_2SO_4).

Now to propene add water (you may use mecuric acetate as it favours Markownikoff addition).

$$CH_3 - CH = CH_2 + H_2O \rightarrow CH_3 - CH(OH) - CH_3 \text{ (propan-2-ol)}$$

$$CH_3 - CH_2 - CH_2 - OH \xrightarrow[(H_2O)]{\text{Conc } H_2SO_4,\ 170^\circ C} CH_3 - CH = CH_2$$

$$CH_3 - CH = CH_2 \xrightarrow{HBr} CH_3 - \underset{Br}{CH} - CH_3 \longrightarrow CH_3 - \underset{OH}{CH} - CH_3$$