(a) Primary alcohol (1°) These are alcohols that contain two hydrogen that are also attached to the carbon holding the (OH) functional group. Example: CH_3CH_2OH (Ethanol)

(b) Secondary alcohols (2°) These are alcohols that contain one hydrogen atom that was attached to the carbon holding the (OH) functional group. e.g. $CH_3CH(OH)CH_3$ Propan-2-ol

(c) Tertiary alcohol (3°) Tertiary alcohol Alcohols that contain no alkanol that is attached to the carbon holding the (OH) functional group. eg

Example: $CH_3-CH_2-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-CH_3$ 2methylbutan-2-ol

2 Discussion of the solubility of alcohols in water, organic solvent. These are the following explanations

- Lower alcohol's are soluble in water and as the number of carbon atoms increase solubility decreases
- Alcohols are always soluble in organic compounds because they are both organic.

3 The steps involved in the industrial manufacture of ethanol. Those are the steps and the relevant equations.

Step 1

The starch used, contains materials include molasses, potatoes, cereals, etc are warming with malt to 60°C for a specific period of time after into maltose by the enzyme diastase contained in the malt.

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

Carbohydrate

Step 2

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

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

maltose → glucose

Step 3

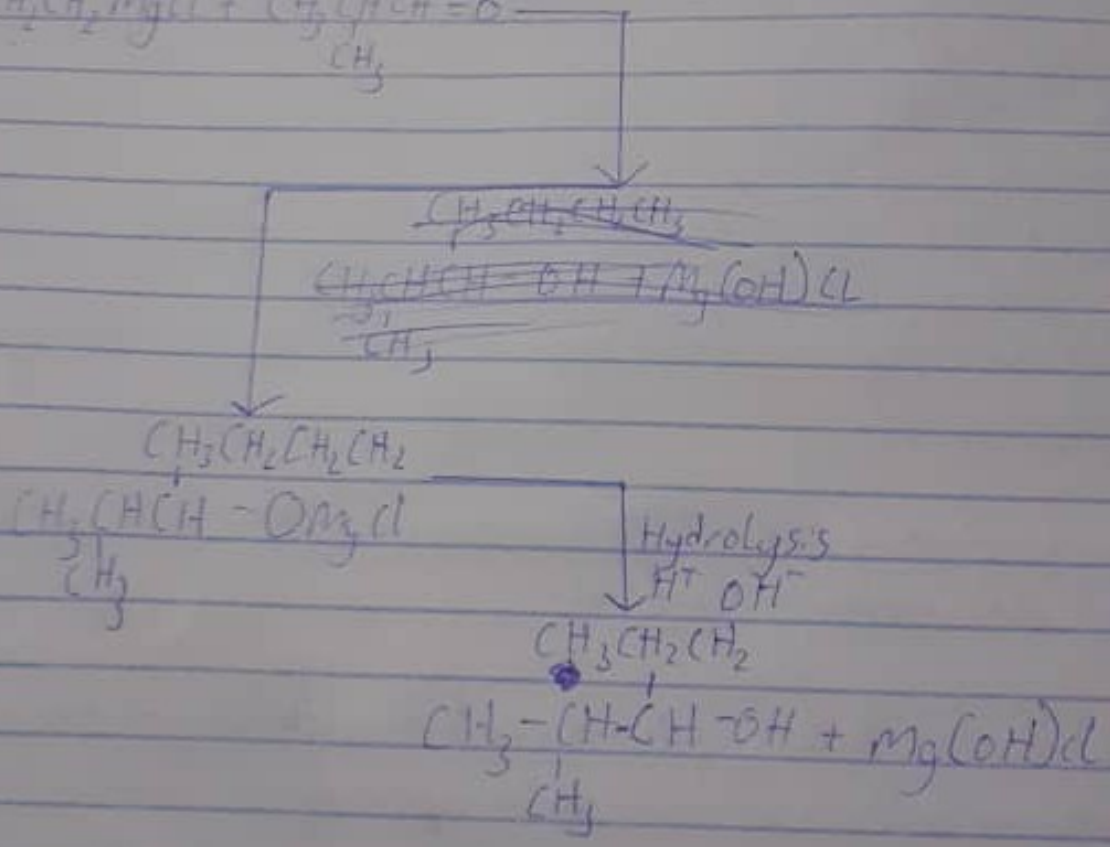
The glucose at constant temperature of 15°C is then converted into alcohol by enzyme Zymase contained also in yeast

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

Glucose → Ethanol

4 The reaction between 2-methylpropanal and butylmagnesium

$CH_3CH_2CH_2CH_2MgCl + CH_3CH(CH_3)CH=O$



$CH_3CH_2CH_2CH_2CH(CH_3)CH(CH_3)OMgCl$

$CH_3CH_2CH_2CH(CH_3)CH(CH_3)OH + Mg(OH)Cl$

5 We were told to skip

6 There is no chemical like 2-Methylpropanone

7) The reduction of 2-methyl propanal

$$CH_3CH(CH_3)CH=O \xrightarrow[[H_2]]{LiAlH_4} CH_3CH(CH_3)CH_2OH$$

8) The conversion of propan-1-ol to propan-2-ol

$$CH_3-CH_2-CH_2-OH \xrightarrow[170^\circ C\ (-H_2O)]{Conc\ H_2SO_4} CH_3CH=CH_2 \xrightarrow{HBr} CH_3CH(Br)CH_3 \xrightarrow{KOH} CH_3CH(OH)CH_3$$

Propan-2-ol