1) primary alcohols: In a primary alcohol the carbon which carries the -OH group is only attached to one alkyl group e.g CH_3-CH_2-OH
ethanol

2) Secondary alcohols: The carbon with -OH group attached is joined directly to two alkyl group which may be same and different

e.g OH
$CH_3-CH-CH_3$
propan-2-ol

3) Tertary alcohols - The carbon atom holding the -OH group is attached directly to three alkyl group which may be any Combination or different

e.g OH
CH_3-C-CH_3
CH_3

2-Methyl propane-2

2) Alcohols are soluble in water due to hydroxyl group in the alcohol which is able to form hydrogen bond with water molecules. alcohols which possess smaller hydrocarbon chain are very soluble.

3) Extraction of starch: The crushed source of starch is steamed at 145°C to 150°C under pressure to prepare starch solution known as mash germination before hydrolysis, starch will first undergo germination at 10°C to 15°C for few days. The germinated starch is called malt.

- Hydrolysis of starch: starch is hydrolysed to maltose by an enzyme known as diastase.

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

starch → maltose

Fermentation: finally yeast is added to the maltose yeast secrets the enzymes.

1) maltase: Converts maltose into glucose

2) zymase: Converts glucose to ethanol

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

3) step 1 : $2(C_6H_{12}O_5)_n + nH_2O \xrightarrow{\text{diastase}} nC_{12}H_{22}O_{11}$

step 2 : $C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{maltase}} 2C_6H_{12}O_6$

step 3 : $2C_6H_{12}O_6 \xrightarrow{\text{zymase}} 2C_2H_5OH + 2CO_2$

4) $H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{H}{|}}{C}}-C(=O)-H + C_4H_9MgCl \xrightarrow{H_3O^+} H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{OH}{|}}{C}}-C_4H_9 + Mg(OH)Cl$

5) $H-\underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}}-\underset{\underset{CH_3}{|}}{C}=O + C_4H_9MgCl \rightarrow C_4H_9-\underset{\underset{H}{|}}{\overset{\overset{O-MgCl}{|}}{C}}-H$

$C_4H_9-\underset{\underset{H}{|}}{\overset{\overset{OH}{|}}{C}}-H + Mg(OH)Cl$ (with H_3O^+, C_4H_9)

6) $H-\underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}}-\underset{\underset{CH_2}{|}}{C}=O \xrightarrow[H_2O]{NaBH_4} H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{OH}{|}}{C}}-H$