NAME: OKWUOBWU BRYAN COURSE; CHEM 102
MATRIC NO; 19/ENG05/049 DEPARTMENT Mechatronics

1) Alcohols are classified into 2;

(A) Based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. They can be subdivided into primary, secondary, and tetiary alcohols.
Example; CH_3OH (methanol) /primary alcohol

(B) Based on the number of hydroxyl groups they possess. They can be subdivided into monohydric, dihydric, and trihydric alcohols. Monohydric having one hydroxyl group in the structure, dihydric having two present in the structure and trihydric having three present in the structure. Polyhydric alcohols have more than three hydroxyl groups present.
Example; $CH_3CH_2CH_2OH$ (propanol) /Monohydric alcohol

(2) 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 water solubility of 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) Step 1; The starch containing materials, including rice, potatoes, are warmed with malt to 60°C for a specific time period and converted into maltose by the enzyme diastase contained in malt.

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

Carbohydrate — 60°C/diastase — maltose

Step 2; The maltose is broken down into glucose on addition 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

Step 3; The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast.

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

Glucose

(4) $CH_3CH_2CH_2CHO + C_4H_9MgCl \longrightarrow C_7H_{16}C-OMgCl$

$$\xrightarrow[\text{dil. acid}]{H^+\ OH^-} C_7H_{15}C-OH + Mg(OH)Cl$$

(4) $CH_3CH_2CH_2CHO + C_4H_9MgCl \longrightarrow C_4H_9-\overset{CH_3CH_2CH_2}{\underset{H}{C}}-O-MgCl$

$$\xrightarrow[\text{dil. acid}]{H^+\ OH^-} C_4H_9-\overset{CH_3CH_2CH_2}{\underset{H}{C}}-OH + Mg(OH)Br$$

(5) $CH_3CH_2CH_2COCH_3 + C_4H_9MgCl \longrightarrow C_4H_9-\overset{CH_3CH_2CH_2}{\underset{CH_3}{C}}-O-MgCl$

$$\xrightarrow[\text{dil. acid}]{H^+\ OH^-} C_4H_9-\overset{CH_3CH_2CH_2}{\underset{CH_3}{C}}-OH + Mg(OH)Br$$

$$CH_3CH_2CH_2COCH_3 \xrightarrow[LiAlH_4/(C_2H_5)_2O]{} CH_3CH_2CH_2CH_3CHOH$$

7) $$CH_3CH_2CH_2CHO \xrightarrow[LiAlH_4/(C_2H_5)_2O]{} CH_3CH_2CH_2CH_2OH$$

8)

$$\underset{\text{propan-1-ol}}{CH_3CH_2CH_2OH} \xrightarrow[170^\circ C]{\text{conc. } H_2SO_4} \underset{\text{propan-1-ene}}{CH_3-CH=CH_2} \xrightarrow{HBr} CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$$

$$\xrightarrow{KOH(aq.)} \underset{\text{propan-2-ol}}{CH_3-\underset{\underset{OH}{|}}{CH}-CH_3}$$