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MATRIC NO: 19/MHS02/087

COURSE: GENERAL CHEMISTRY 102

DEP: MHS/NURSING

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CHEM 102 (GENERAL CHEMISTRY)

1. a) They are classified based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group.
- If its more than two hydrogen atoms → $1°$ (Primary alcohol)
- If its more than Just one hydrogen atom → $2°$ (secondary alcohol)
- If its none → $3°$ (Tertiary alcohol)

Example : CH_3OH $(1° \Rightarrow$ Primary alcohol)

(b) They are also classified based on the number of hydroxyl group they posses.
- monohydric alcohol $\Rightarrow$ If theres only one hydroxyl groups.
- Dihydric alcohol $\Rightarrow$ If there are two hydroxyl groups.
- Trihydric alcohol $\Rightarrow$ If there are three hydroxyl groups.

polyhydric alcohol ⇒ If there are more than three hydroxyl groups.

Example: $HOCH_2CH_2OH$ (Ethane-1-2-diol) etc (dihydric alcohol).

2. For water:
All Lower alcohols with up to three carbon atoms in their molecules are soluble because they can form hydrogen bonds with water molecules.
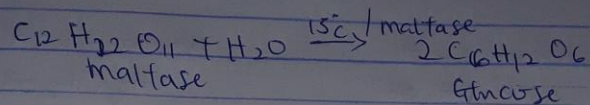
• For organic solvents:
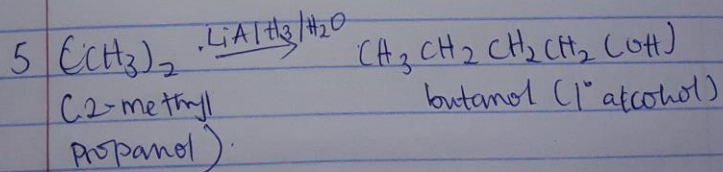All monohydric alcohols are soluble in organic solvents.
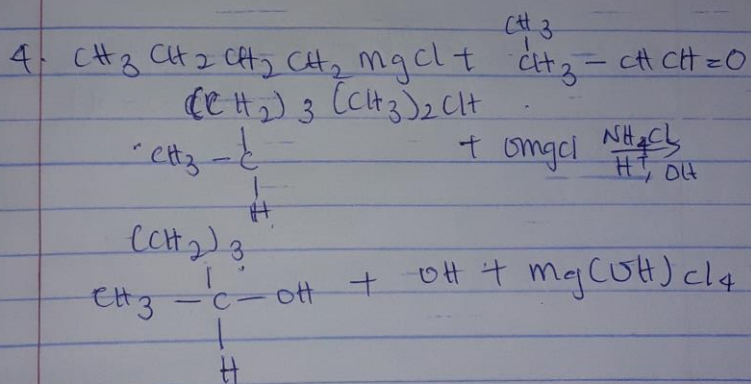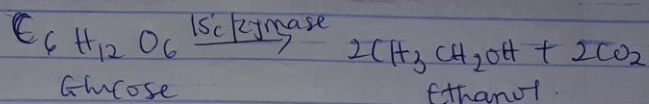
3. $2(C_6H_{12}O_6)n + nH_2O \rightarrow n C_{12}H_{22}O_{11}$
  Carbohydrate.   maltase

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

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

maltase   Glucose

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

$$C_6H_{12}O_6 \xrightarrow{\text{15°C zymase}} 2CH_3CH_2OH + 2CO_2$$

Glucose   Ethanol

4. $CH_3 CH_2 CH_2 CH_2 mgCl + \overset{CH_3}{\overset{|}{C}H_3} - CH\,CH=O$

$(CH_2)_3 (CH_3)_2 CH$

$$CH_3 - \overset{|}{\underset{|}{C}} \qquad\qquad + \text{5mgCl} \xrightarrow[H^+, \text{OH}]{NH_4Cl}$$

$(CH_2)_3$

$$CH_3 - \overset{|}{\underset{|}{C}} - OH \quad + \quad OH + mg(OH)cl_4$$

5. $(CH_3)_2 \xrightarrow{LiAlH_3 / H_2O} CH_3 CH_2 CH_2 CH_2 (OH)$

(2-methyl   butanol (1° alcohol)
propanol).

6 propan - 1 - ol   propan - 2 - ol

   $CH_3 CH_2 CH_2 OH$ $CH_3 CH_2 OH CH_3$

   $CH_3 CH_2 CH_2 OH + H_2SO_4 \rightarrow CH_3 CH_2 CH_2 OH_2 OSO_3H$

$CH_3 CH_2 CH_2 OH_2 OSO_3H \xrightarrow{-H_2O} CH_3 CH_2 CH_2 OSO_3 H$

$CH_3 CH_2 CH_2 OSO_3 H \xrightarrow{-H_2SO_4} CH_3 CH = CH_2$

$CH_3 CH = CH_2 \xrightarrow{[H^+OH^-]} CH_3 CH_3 COH) CH_3$

                              (propan - 2 - ol)