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Electrical/Electronics Engineering
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CHM 102

(a) Based on number of hydrogen attached to carbon atom containing the hydroxyl group:-

- If the number of hydrogen atom attached to the carbon atoms bearing the hydroxyl group are three or two, it is called primary alcohol (1°) e.g. $\text{C}_2\text{H}_5\text{OH}$ (1°)
- If it is one hydrogen atom, it is called secondary alcohol (2°) e.g. $\text{C}_2\text{H}_5\text{CHOH}\text{C}_2\text{H}_5$ (2°)
- If no hydrogen atom, it is called tertiary alcohol (3°) e.g. $\text{C}(\text{CH}_3)_3$ - $\text{C}(\text{OH})(\text{C}_2\text{H}_5)_3$ (3°)

(b) Based on the number of hydroxyl groups they possess

- Monohydric alcohols: have one hydroxyl group ~~one~~ ~~three or two~~, it is called present in the alcoholic structure e.g. $\text{C}_2\text{H}_5\text{CH}_2\text{CH}_2\text{OH}$
- Dihydric alcohols: ~~structure~~ also glycols have two hydroxyl groups present in their alcoholic structure e.g. $\text{OHCH}_2\text{CH}_2\text{OH}$
- Trihydric alcohols: also triols have three hydroxyl groups present in their alcoholic structure e.g. $\text{OHCH}_2\text{CH}_2\text{CH}_2\text{OH}$
- Polyhydric alcohols: or polyols have more than three hydroxyl groups e.g. $\text{C}_6\text{H}_5\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{C}_6\text{H}_5$

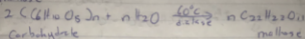
2a) In water:- Lower alcohols with up to three carbon atoms in their molecules, soluble in water because these lower alcohols can form hydrogen bonds with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass

(b) In organic solvents:- All monohydric alcohols are soluble. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with other molecules.

3) Carbohydrates like starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation.

Step 1

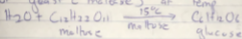
The starch containing content are warmed with malt to 60°C for a specific period of time are converted to maltose



NB:- where n is large

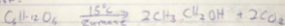
Step 2

The maltose is broken down to glucose on addition of yeast (maltase) at temp 15°C



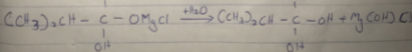
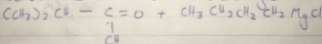
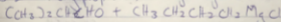
Step 3

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

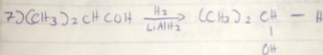
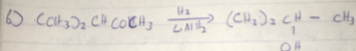
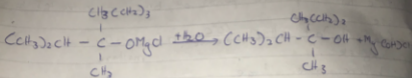


Therefore ethanol is produced

4) 2-Methylpropanal, butylmagnesium chloride



5) 2-Methylpropanone, butylmagnesiumchloride
 $(\text{CH}_3)_2\text{CHCOCH}_3 + \text{CH}_3\text{CH}_2\text{CH}_2\text{MgCl}$
 $(\text{CH}_3)_2\text{CHC}(=\text{O}) + \text{CH}_3(\text{CH}_2)_3\text{MgCl}$



8) Propan-1-ol to propan-2-ol

