

# NO. 1

i) Alcohols are very important organic compounds. Discuss briefly their classification and give one example each.

## CLASSIFICATION BASED ON:

i) Number of hydrogen atoms attached to the carbon atom containing the hydroxyl group.

- Primary alcohol ( $1^\circ$ )  $\hat{=}$  If the no. of hydrogen atoms attached to the carbon bearing the hydroxyl are three or two.
- Secondary alcohol ( $2^\circ$ )  $\hat{=}$  If the no. of hydrogen atoms attached to the carbon bearing the hydroxyl is one.
- Tertiary alcohol ( $3^\circ$ )  $\hat{=}$  If there's no hydrogen atom attached to the carbon bearing the hydroxyl group.

Examples

- \* Primary alcohol ( $1^\circ$ )  $\rightarrow$  Ethanol
- \* Secondary alcohol ( $2^\circ$ )  $\rightarrow$  Propan-2-ol
- \* Tertiary alcohol ( $3^\circ$ )  $\rightarrow$  2-methyl propan-2-ol

ii) Number of hydroxyl groups they possess.

- Monohydric alcohol  $\hat{=}$  They have one hydroxyl group present in their alcohol structure. e.g. propanol
- Dihydric alcohol  $\hat{=}$  They have two hydroxyl groups present in their alcohol structure. e.g. Ethane-1,2-diol
- Trihydric alcohol  $\hat{=}$  They have three hydroxyl groups present in their alcohol structure. e.g. Propanol, 1,2,3-

2. Discuss the solubility of alcohols in water, organic solvents

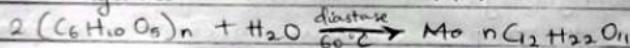
Alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.

All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols and polyhydric alcohols in organic solvents is largely due to their ability to form hydrogen bonds with water molecules.

3. Show the three steps in the industrial preparation of ethanol. Equations of reactions are mandatory.

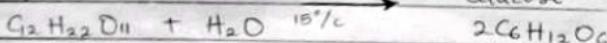
- i) conversion of carbohydrate to maltose by enzyme diastase at  $60^{\circ}\text{C}$

carbohydrate Maltase



- ii) conversion of maltose to glucose by enzyme maltase at  $15^{\circ}\text{C}$ .

Maltose maltase Glucose



- iii) conversion of glucose to ethanol by enzyme zymase at  $15^{\circ}\text{C}$

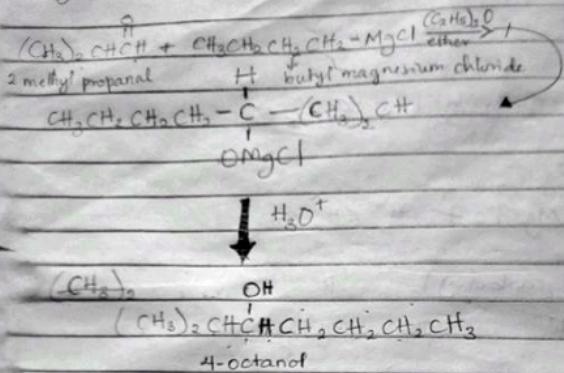
Glucose zymase Ethanol



## HO. 4

4. Reaction between 2-methyl propanal and butyl magnesium chloride.

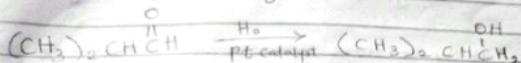
Grignard synthesis:



16, 5C, 475,

NO. 7

7) Reduction of 2-methylpropanal



### 2-methyl propanal

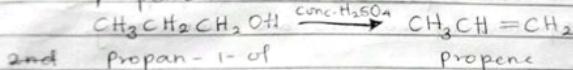
### Butanol

NO. 8

8.) Propose a scheme for the conversion of propan-1-ol to propan-2-ol

1st reaction:

1. Dehydration of propan-1-ol using conc.  $H_2SO_4$  to propene.



and propan-1-ol

2nd reaction:

Hydrolysis of propene to propan-2-ol  
 Due to hydrolysis of water the negative part attaches itself to the propene and thus convert it as propan-2-ol  
 This reaction is called Markonikoff's reaction

