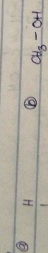


Q. Discuss the two major classification of Alcohols. Give two examples each for each class.

Ans. Classification based on the number of alkyl groups or hydroxy groups.
 Note: Alcohol has the general molecular formula $R-OH$ where R is the alkyl group eg. Methyl - CH_3 .
 While -OH is the hydroxyl group which is the main functional group for alcohol.

Therefore based on this classification, alcohols can be classified as follows:

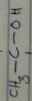
(i) Primary alcohol: Primary alcohols have only one alkyl group or those in two hydrogen atom attached to the OH on atom that carries hydroxyl group.



Alcohol (1°)

Methanol (1°)

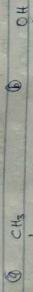
(ii) Secondary alcohol: Secondary alcohols have two alkyl groups or one hydrogen atom attached to the carbon that carries the hydroxyl group.



2-Ethanol (2°)

(iii) Tertiary alcohol: Tertiary alcohols have three alkyl groups and no hydrogen atom attached to have the carbon atom that carries the hydroxyl group.

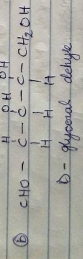
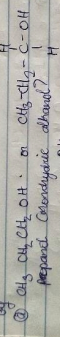
eg.



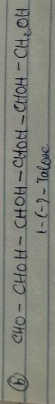
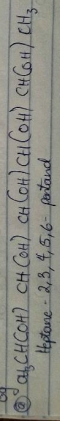
2-methyl propan-2-ol (S) 2-methyl butan-2-ol

2. Classification based on the number of hydroxyl groups they possess.
 Note: The hydroxyl groups has a general formula $\text{R}-\text{OH}$. Therefore based on this classification, alcohols can be classified as follow.

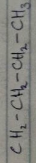
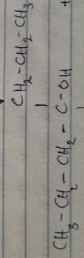
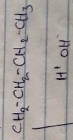
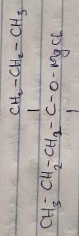
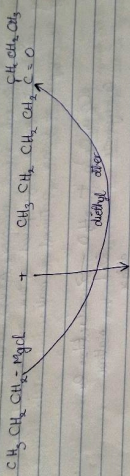
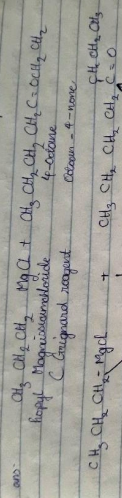
① Monohydric alcohols: Monohydric alcohols have only one hydroxyl group (-OH) present in the alcohol structure



① Polyhydric alcohols: Polyhydric alcohols or polyols are those alcohols having more than three hydroxyl groups in the alcohol structure.



Q In the Grignard synthesis of alcohols, reaction name / Grignard reagent with $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COCH}_2\text{CH}_2\text{CH}_3$. Show the reaction steps.

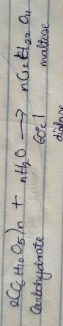


4-Propyl-4-Octanol or magnesium hydride
 or bromide

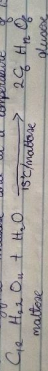
4-Propyl octan-4-ol

5. Discuss the industrial manufacture of ethanol showing all the reactions and necessary enzymes and temperature of reaction.

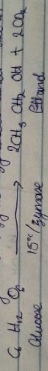
Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast, break down the carbohydrate molecules into sugars found in yeast, breakdown containing materials include molasses, potatoes, cereals, rice and so on coming with to 50°C for a specific period of time are converted in maltose by the enzyme of diastase contained in malt.



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



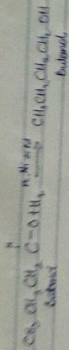
The glucose at constant temperature of 15°C is then converted into alcohol (ethanol) by the enzyme zymase contained also in yeast.



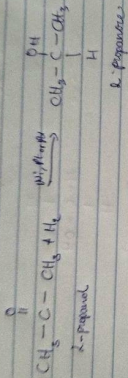
6. Determine the product obtained used in the reduction of Alkanoic acid and Alkanol. Use a specific example for each and show the equation of reaction.

Alkanols and alkanes are reduced to primary and secondary Alkanols by hydrogenation of carbon-oxygen double bond of the presence of a catalyst such as Platinum (Pt) (nickel Ni), Palladium (Pd) catalyst or with sodium tetraborate (Na₂B₄O₇)

Examples: Reduction of an alkanol yields the alkanol are reduced to primary alkanols eg



Reduction of an alkanone yield a secondary alcohol



2-propanol