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Course code: CHM 102

Department: Medicine & Surgery

1. Discuss the two major classification of alkanols  
Give the examples for each class.

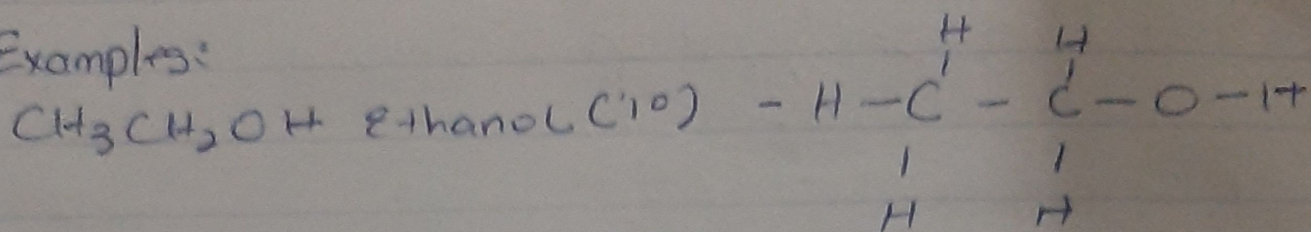
ANSWER

Q. Classification based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group.

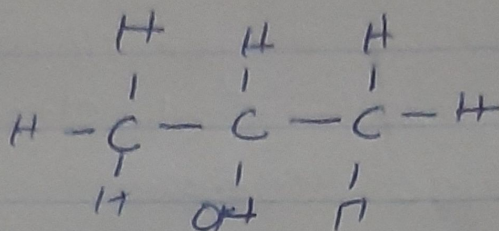
If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a Primary alkanol ( $1^\circ$ ) [In a Primary alcohol, the hydroxyl group is attached to a Primary (or terminal) carbon atom in the molecule, it is characterized by  $-\text{CH}_2\text{OH}$ ]. If it is one hydrogen atom attached to a saturated carbon atom bearing the hydroxyl group, it is called "Secondary alkanol" ( $2^\circ$ ) [In secondary alkanol, the  $-\text{OH}$  group is attached to a secondary carbon atom. It is characterized by  $\text{CHOH}$ ]. If no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, then it is called a tertiary alkanol ( $3^\circ$ ).



Examples:



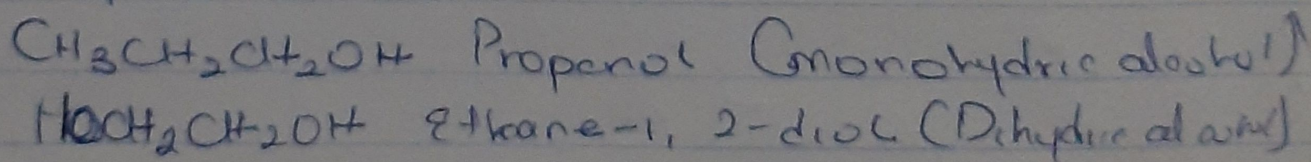
$\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$  Propan-2-ol (2<sup>o</sup>)



(b) Classification based on the number of hydroxyl group they possess.

Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called glycols have two hydroxyl groups present in the alcohol structure. Trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups.

Examples:

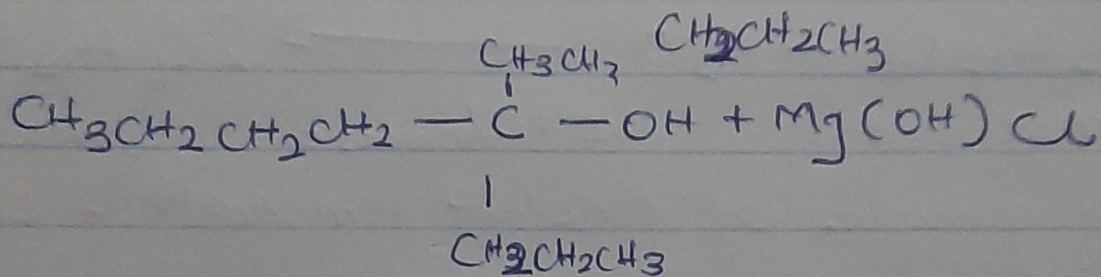
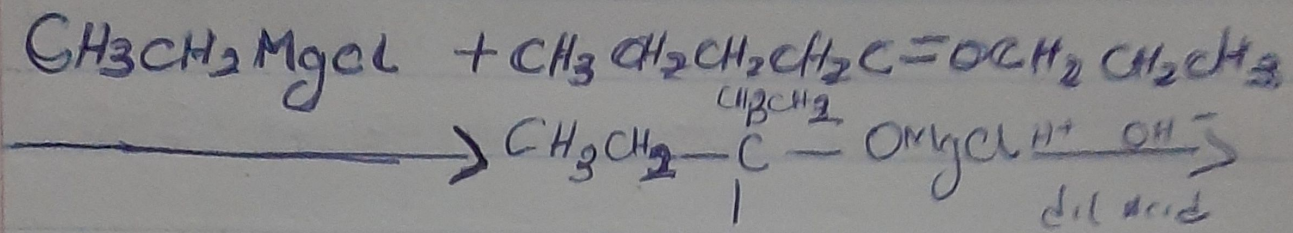




2) In the Grignard Synthesis of alcohols, react a named Grignard reagent with  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$ . Show reaction steps.

ANSWERS

Grignard reagent :  $\text{CH}_3\text{CH}_2\text{MgCl}$  - (ethyl magnesium chloride)



3) Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature reaction

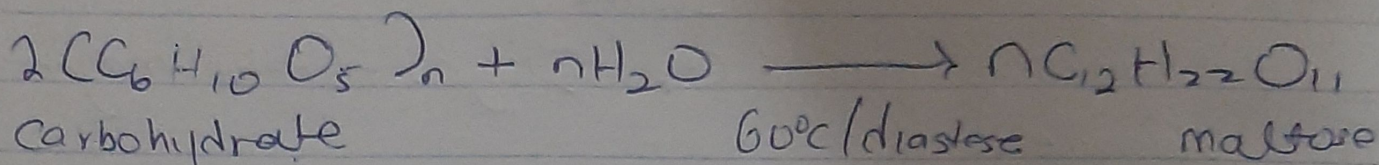
ANSWER

#### INDUSTRIAL PRODUCTION OF ETHANOL

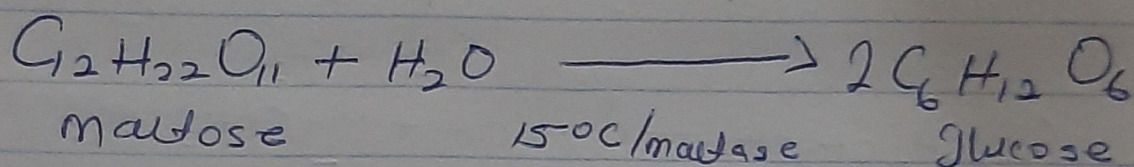
Carbohydrates such as starch are major groups of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts enzymes found in the yeast of 95%. The starch containing materials include molasses, potatoes, cereals, rice and so on.



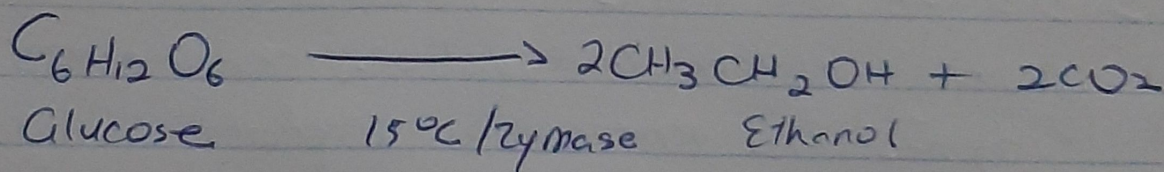
warming with - malt to  $60^{\circ}\text{C}$  for a specific period of time. are converted into maltose by the enzyme diastase contained in the malt.



The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of  $15^{\circ}\text{C}$ .



The glucose at constant temperature of  $15^{\circ}\text{C}$  is then converted into alcohol by the enzyme zymase contained also in yeast



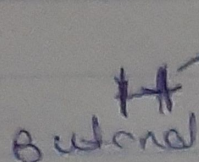
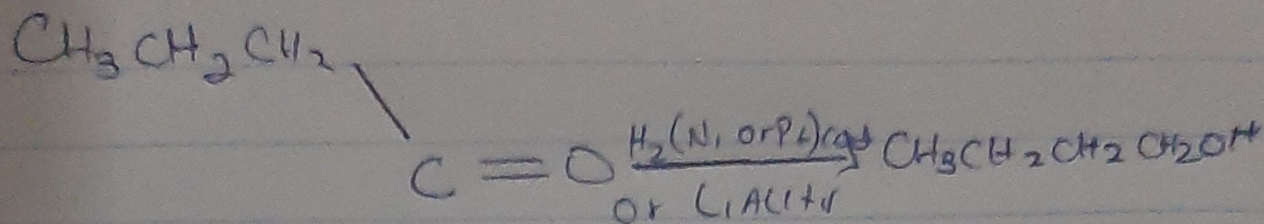
4. Determine the Product obtained in the reduction of alkanone and alkanal. Use a specific example for each and show the equation of reaction.

ANSWER

THE REDUCTION OF ALKANONE AND ALKANAL



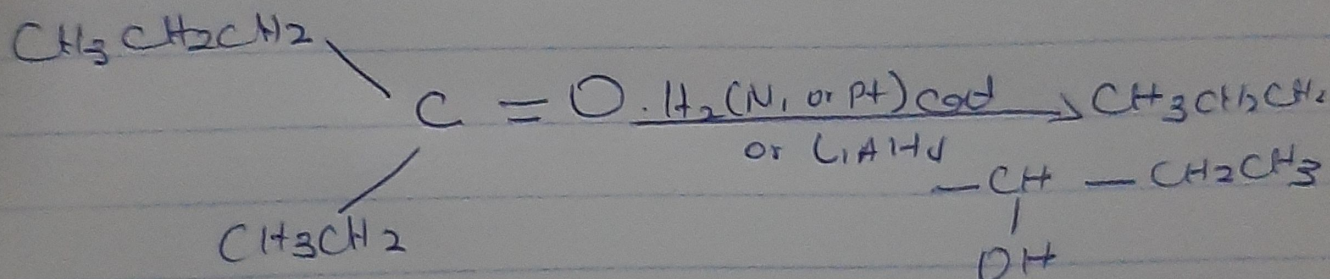
### ALKANAL



Butanol

The reaction above shows the reduction of an alkanal (e.g. Butanal) to an alcohol (e.g. Butanol)

### ALKANONE



Hexan-3-one

Hexan-3-ol

The reaction above shows the reduction of an alkanone (e.g. Hexan-3-one) to an alcohol (e.g. hexan-3-ol)