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CHM102

Assignment

1. Discuss the two major classification of Alkanols. Give two Examples each of each class

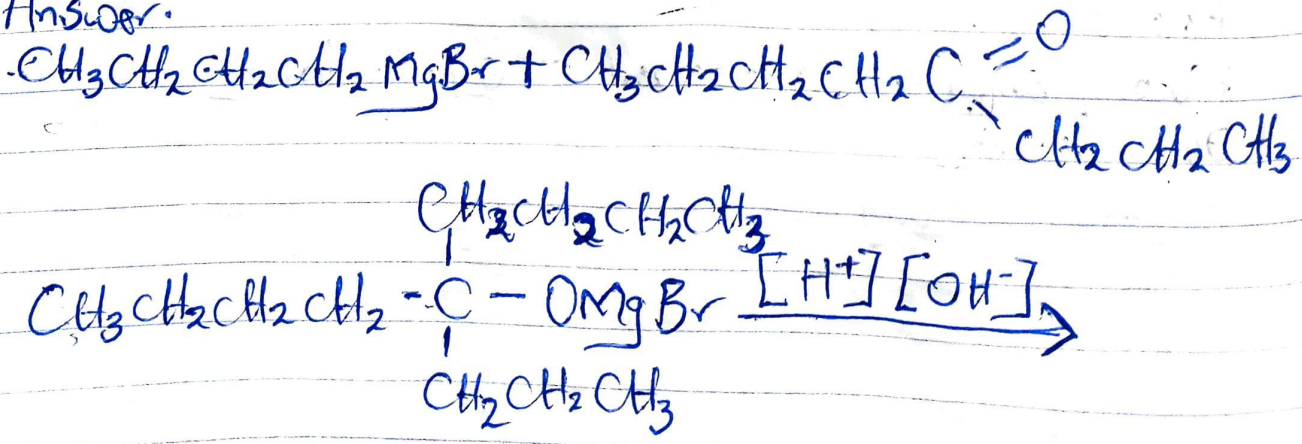
Answer

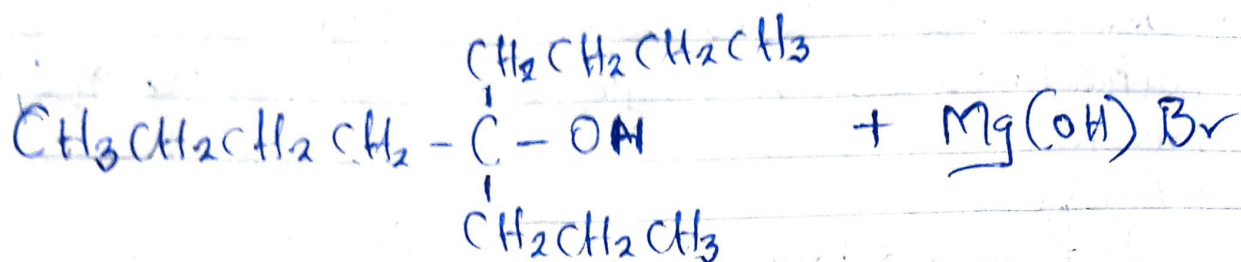
i. The first class is based on the number of hydrogen atoms attached to the Carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the Carbon atom bearing the hydroxyl group are three or two, it is called a Primary alcohol (1°). If it is one hydrogen atom, it is called secondary alcohol (2°), and if no hydrogen atom is attached to the Carbon atom bearing the hydroxyl group, it is called a tertiary alcohol (3°). Examples are: CH_3OH (Methanol) (1°)
 $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ (Propan-2-ol) (2°)

ii. The Second class is based on the number of hydroxyl groups 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 while 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 are: $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (Propanol)
 $\text{HOCH}_2\text{CH}_2\text{OH}$ (Ethane-1,2-diol)

2. In the Grignard synthesis of alkanols, 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 the reaction steps.

Answer



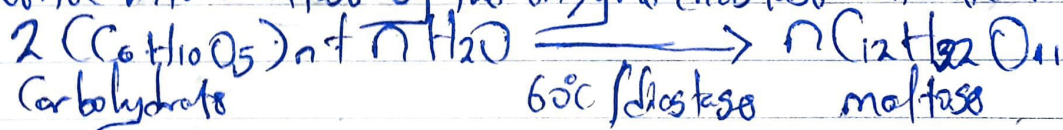


Final Product: 5-Propyl-Nonan-5-ol

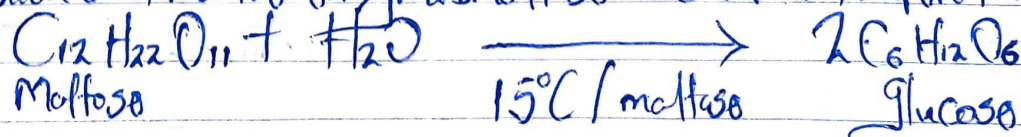
3. Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction

Answer

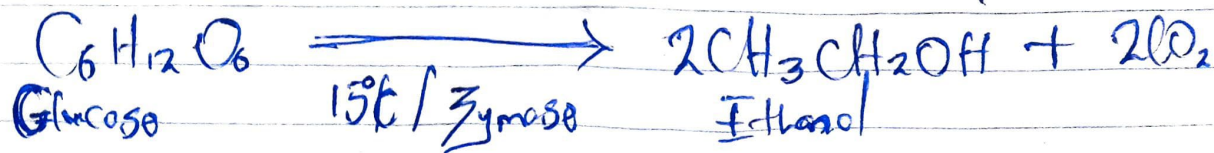
Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt at 60°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°C.



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

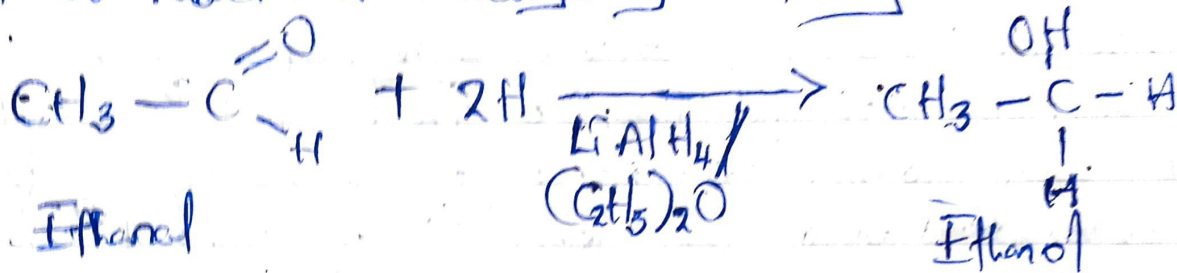


4. Determine the Product obtained in the reduction of alkenones and alkanal. Use a specific example for each and show the equation of reaction.

Answer

Aldehydes and ketones can be reduced to alcohols by the usual reducing agents such as Lithium tetrahydridoaluminate (III) in ethoxy ethane ($\text{LiAlH}_4 / (\text{C}_2\text{H}_5)_2\text{O}$), Lithium tetrahydridoborate (III) in water or methanol. This method is useful for the synthesis of primary and secondary alcohols.

- > The reduction of an aldehyde gives primary alcohol



- > The reduction of ketone gives a secondary alcohol

