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Course: CHM102

Assignment

- i) Discuss the two major classification of Alkanols. Give two examples each for each class.

Answer

- a) 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 containing the hydroxyl group are three or two, it is called a "primary alcohol (1°)".
- If it is one hydrogen atom, it is called a 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°)".

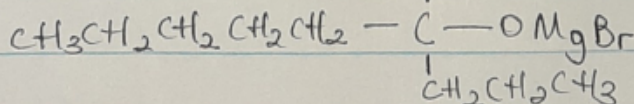
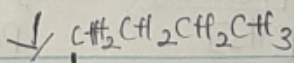
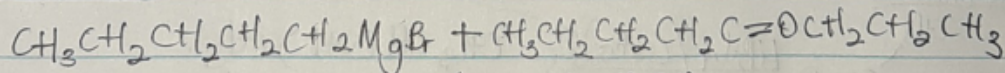
Examples are: Methanol (CH_3OH) - (1°), Ethanol, $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ - (1°)

- b) Based on the number of hydroxyl groups they possess:

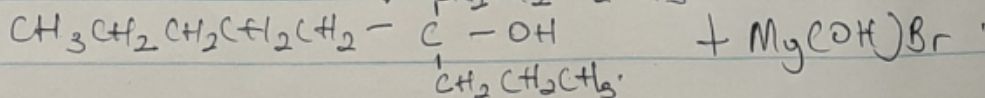
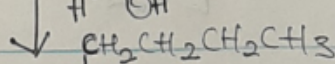
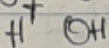
- Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols which are also called Glycols, have two hydroxyl groups present while the Trihydric alcohols (triols) have three hydroxyl groups present in the structure of the alcohol.
- e.g Propanol (Monohydric alcohol) - $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$, and Propane-1,2,3-triol (Trihydric alcohol) - $\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$.

- 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



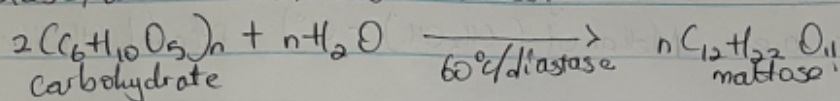
hydrolysis



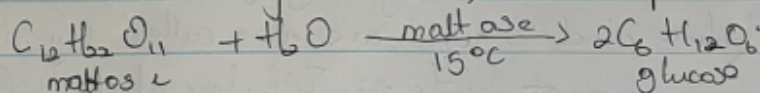
8) Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction

Answer

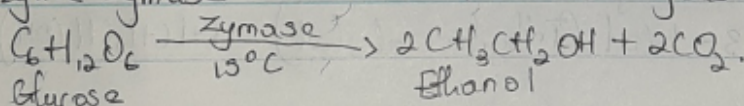
Ethanol can be manufactured by the biological process of fermentation of ~~natural compounds~~ ^{carbohydrates} such as starch which are major groups of natural compounds. Enzymes, which are the biological catalysts found in yeast, breaks down the carbohydrate molecules into ethanol and gives a yield of 95%. The starch containing materials include potatoes, rice, molasses, etc and on warming with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase, which is contained in the malt.



The maltos is then broken down into glucose on addition of yeast which contains the enzyme maltase, at a temperature of 15°C.

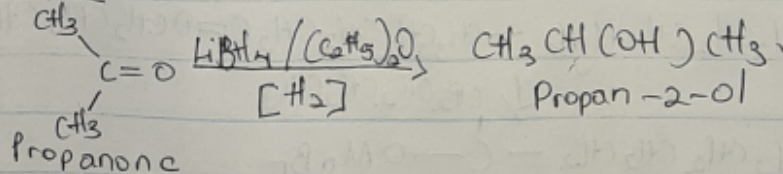


At a constant temperature of 15°C is then converted into alcohol by the enzyme zymase which is also contained in yeast.



4. Determine the product obtained in the reduction of Alkanone and Alkanal. Use a specific example for each and show the equation of reaction.

i) Alkanone



ii) Alkanal

