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CHEM 102

CLASSIFICATION OF ALKANOLS WITH EXAMPLES

1. Classification 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 bearing the hydroxyl group are 2 or 3 it's called a primary alcohol. It's called a secondary alcohol when it's one hydrogen atom bearing the hydroxyl group. If no hydrogen atom is attached to the carbon bearing the hydroxyl group it's called tertiary alcohol. E.g. $\text{CH}_3\text{CH}_2\text{OH}$ -ethanol (1°) (2). $(\text{CH}_2)_3\text{C-OH}$ -2-propanol
2. Classification based on the number of hydroxyl groups they possess. Monohydric alcohols have only one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called glycols they have 2 hydroxyl groups present in the alcohol structure while trihydric has 3 hydroxyl groups present in the alcohol structure and polyhydric has more than 3 alcohol structure e.g. ethanol and propan-2-ol

2 Grignard synthesis of alkanols

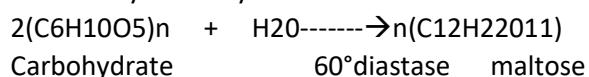
Grignard reagent- $\text{C}_2\text{H}_5\text{MgBr}$

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO} + \text{C}_2\text{H}_5\text{MgBr}$

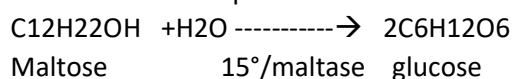
$\text{C}_4\text{H}_9\text{C}_3\text{H}_7\text{CHO} + \text{C}_2\text{H}_5\text{MgBr} \rightarrow \text{C}_4\text{H}_9\text{C}_3\text{H}_7\text{CH}_2\text{C}_2\text{H}_5 + \text{Mg(OH)Br}$

3. Industrial preparation of ethanol

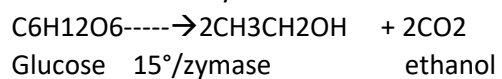
Carbohydrates such as starch are major groups of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalyst, enzymes found in yeast to break down the carbohydrates molecules into ethanol to give a yield of 95%. On warming starch with malt to 60° 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 a temperature of 15°



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

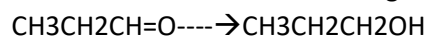


4. Alkanol reduction of Alkanone gives secondary alcohols



LiAlH₄

Alkanals reduction of alkanone gives secondary alkanols



LiAlH₄/H₂O