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Course: General Chemistry II (Chem 102)

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No. 1

- Alcohols are very important organic compounds. Discuss briefly their classification and give one example each.

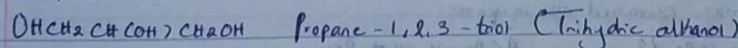
* The classification based on the number of hydrogen atoms attached to the carbon atom containing the OH functional group. If the number of hydrogen atoms attached to the carbon atom bearing the OH group is two, it is called a primary alcohol (1°). If it is one hydrogen atom, it is called a secondary alcohol (2°) and if no hydrogen atom is attached to the carbon atom bearing the OH group, it is called a tertiary alcohol (3°).

Examples:



* Classification based on the number of OH functional groups present in the structure of the alcohol. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols have two hydroxyl groups present in the alcohol structure. Trihydric alcohols have three hydroxyl groups present in the alcohol structure. Polyhydric alcohols have more than three hydroxyl groups.

Examples:



No. 2

- Discuss the solubility of alcohols in water, organic solvents.

Solubility in Water

Lower alcohols, with up to three carbon atoms in their molecules are soluble in water.

because these lower alcohols can form hydrogen bonds with water molecules. The water solubility of alcohols decreases, as their relative molecular mass increases, because the structure becomes relatively more hydrocarbon in nature.

Solubility in Organic Solvents

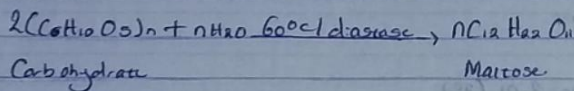
All monohydroxy alcohols are soluble in organic solvents. Addition of hydroxyl (-OH) group without increasing the number of carbon atoms increases the solubility in water and decreases the solubility in ether and ethanol.

No. 3

Show the three steps in the industrial manufacture of ethanol. Equations of reactions are mandatory.

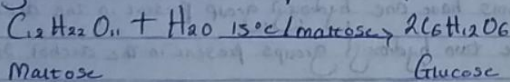
Step I

The starch containing materials on cooking with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



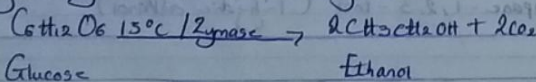
Step II

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



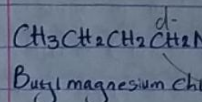
Step III

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



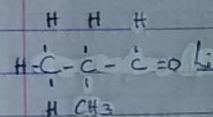
No. 4

Show the reaction between synthesis:



No. 7

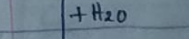
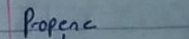
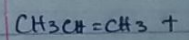
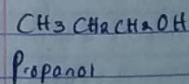
Show the reduction:



2-methylpropanal

No. 8

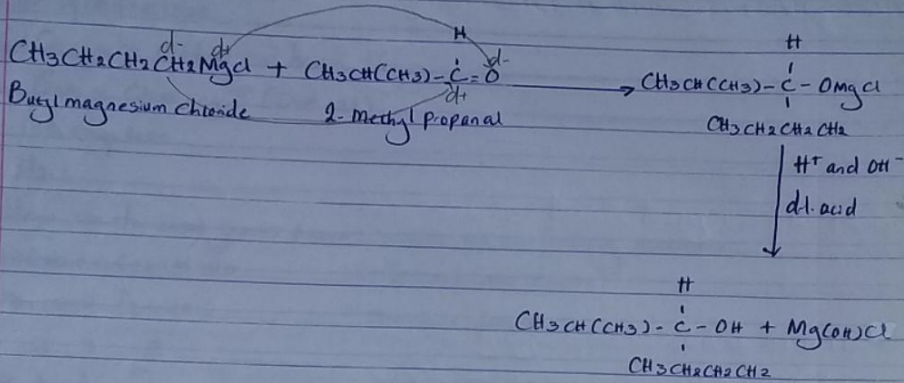
Propose a scheme:



Propan-2-ol

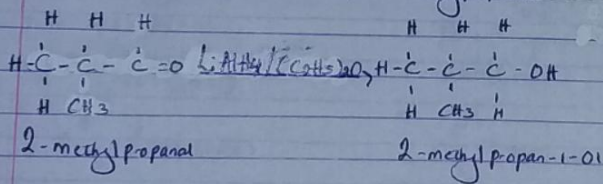
No. 4

Show the reaction between 2-methylpropanal and butylmagnesium chloride. Hint: Grignard synthesis.



No. 7

Show the reduction reaction of 2-methylpropanal.



No. 8

Propose a scheme for the conversion of Propan-1-ol to Propan-2-ol

