

1. Explain the two major classification of alcohols  
Give the examples each for each class

Alcohols

a. Alcohols are classified based on the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group. If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are two or three, it is called a primary alcohol. If it is one hydrogen atom it is called a secondary alcohol and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a tertiary alcohol.

- (i) methanol  $(CH_3OH)$
- (ii) Butan-2-ol  $(C_4H_{10}(OH)CH_2)$

b. They are also classified based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols, also called diols, have two hydroxyl groups present in the alcohol structure and the 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.

- (i) Glycerol (trihydric alcohol)  $C_3H_8(OH)_3$
- (ii) Ethane-1,2-diol (dihydric alcohol)  $H_2C(OH)_2$

Chem 02

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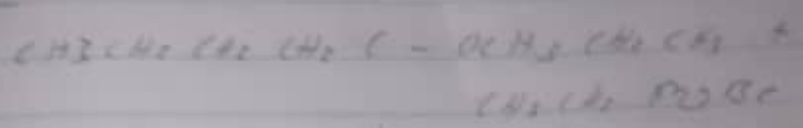
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2) In the Grignard synthesis of alcohols, what is named Grignard reagent with:

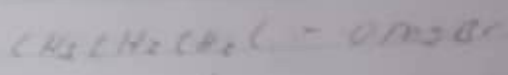
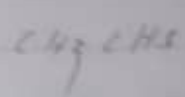


Show the reaction scheme

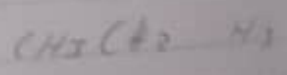
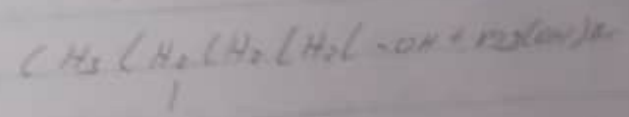
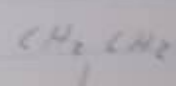
Scheme



↓



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3-Butylethanol-3-ol

2) Determine the product obtained in the reduction of alkanone and alkanal. Use a specific example for each and show the equation of reaction.

Answer

⇒ Products obtained in the reduction of Alkanal & alkanone:

Aldehyde and ketones are reduced to primary and secondary alcohols respectively by reacting with hydrogen in the presence of a platinum or nickel catalyst or with aluminium isopropoxide or with complex metal hydride, such as lithium trihydridoaluminate (LiAlH<sub>4</sub>) or sodium tetrahydridoaluminate (NaAlH<sub>4</sub>).



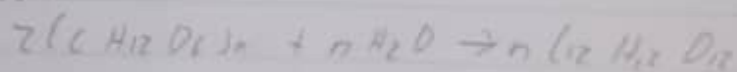
3) Discuss the industrial manufacture of alcohol showing all reaction equations and reactions, enzymes & temperature of reaction.

### Answer

Carbohydrates such as starch are major source of natural compounds that can be made to yield ethanol by the biological process of Fermentation.

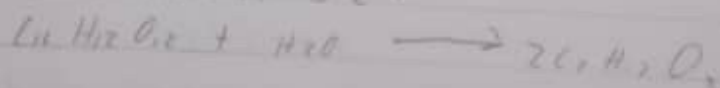
#### Step 1

The starch containing materials include maize, potatoes, cereals, rice & on mashing with malt to boil for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



#### Step 2

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



#### Step 3

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

