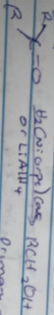
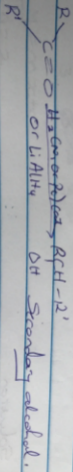


hydrogen in the presence of a platinum or nickel catalyst or with aluminium isopropoxide or CrCl_3 Messner (Ziegler-Natta reaction) or with complex metal hydrides such as lithium tri-*n*-butylaluminum hydride (LiAlH_4) or sodium tri-*n*-butylaluminum hydride (NaAlH_4) or sodium tri-*n*-butylaluminum hydride (NaAlH_4)

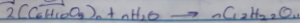
Aldelydes



Ketone



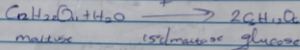
by enzyme diastase contained in the malt.



Carbohydrate $\xrightarrow[60^\circ C]{\text{diastase}}$ maltose

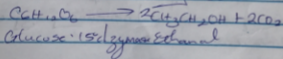
3) Breaking of disaccharides to monosaccharides.

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of $15^\circ C$



4) Breaking down of glucose to ethanol

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



4) Determine the product obtained in the reduction of Aldehydes and Ketones. Use a specific example for each and show the equation of the reaction.

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Aldehydes and ketones are reduced to primary and secondary alcohols respectively by reaction with

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CHM 102

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Discuss the two major classification of Alcohols. Give two examples each for each class.

1) Based on the ^{number of} hydrogen atoms attached to the carbon atom containing the hydroxyl group; if the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a primary alcohol (1°). It is a secondary and tertiary alcohol if it is one and no hydrogen atoms attached to the carbon atom bearing the hydroxyl group, respectively.

Examples are $\text{CH}_3\text{CH}_2\text{OH}$ (Ethanol (1°))
 $(\text{CH}_3)_2\text{C}-\text{OH}$ 2-methylpropan-2-ol (3°)

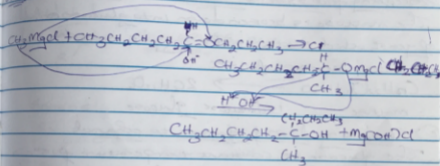
2) Based on the number of hydroxyl group they possess; Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols also called glycols have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the alcohol structure. Polyhydric alcohols or polyols have more than 3 hydroxyl groups.

Examples are $\text{HOCH}_2\text{CH}_2\text{OH}$ Ethane-1,2-diol (Dihydric alcohol)
 $\text{OHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$ propan-1,2,3-triol (trihydric alcohol)

2) In Grignard synthesis of Alcohols, react a named Grignard reagent with $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}(=\text{O})\text{CH}_3$, CH_2CH_3 .

Show the reaction steps

ans



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

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② Breaking of carbohydrates to disaccharides

The process begins with fermentation. The biological catalysts enzymes found in yeast breakdown the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on warming with water to 60°C for a specific period of time converted into maltose