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Course: CHM 102

Department: Computer Engineering

Matric No: 19/ENGO21068

Assignment Title: Assignment ~~on~~

1) Discuss the two major classification of Alkanols. Give two Examples each for each class

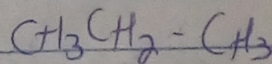
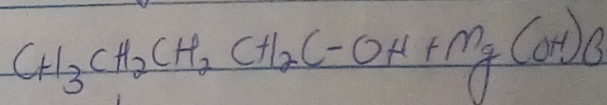
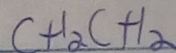
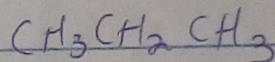
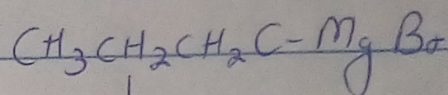
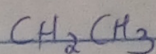
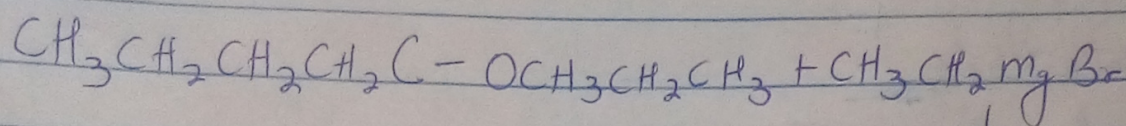
a) Alkanols are classified based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the hydroxyl group are two or three, it is called a primary alcohol. If it is one hydrogen atom, it is called a secondary alcohol and if no hydrogen atom is attached to the carbon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

E.g. Methanol -  $\text{CH}_2\text{OH}$  Butane-2-ol -  $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$   
Methylpropan-2-ol -  $(\text{CH}_3)_3\text{C}-\text{OH}$

b) They are also classified based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structures. Dihydric alcohols also called glycols, have two hydroxyl groups present in the alcohol structure while the trihydric alcohols have three hydroxyl group present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl group

E.g.: Propanol (monohydric alcohol) -  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$   
Ethane-1,2-diol (Dihydric alcohol) -  $\text{HOCH}_2\text{CH}_2\text{OH}$

2) In the Grignard Synthesis of Alcohols, 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.



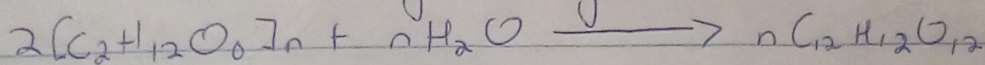
3-Butylethane-3-ol

3) Discuss the Industrial Manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction

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

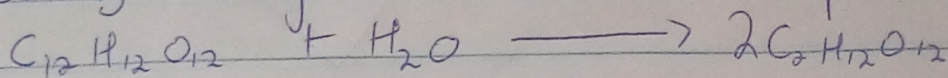
• step 1

The starch containing materials include potatoes, cereals, rice and on warming with malt to  $60^{\circ}\text{C}$  for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



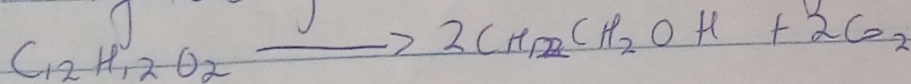
• step 2

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



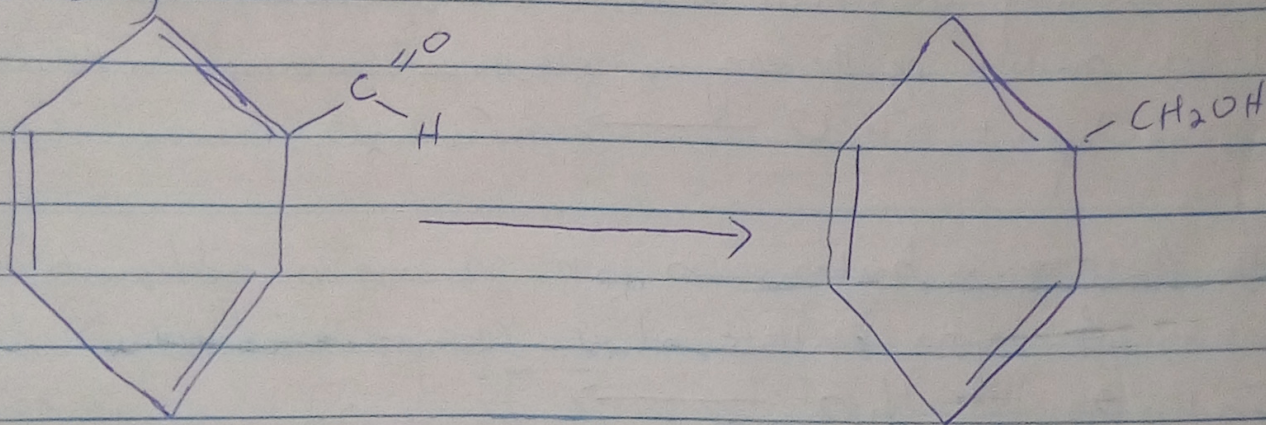
• step 3

The glucose at constant temperature of  $15^{\circ}\text{C}$  is then converted into alcohol by the enzyme contained <sup>also</sup> in yeast



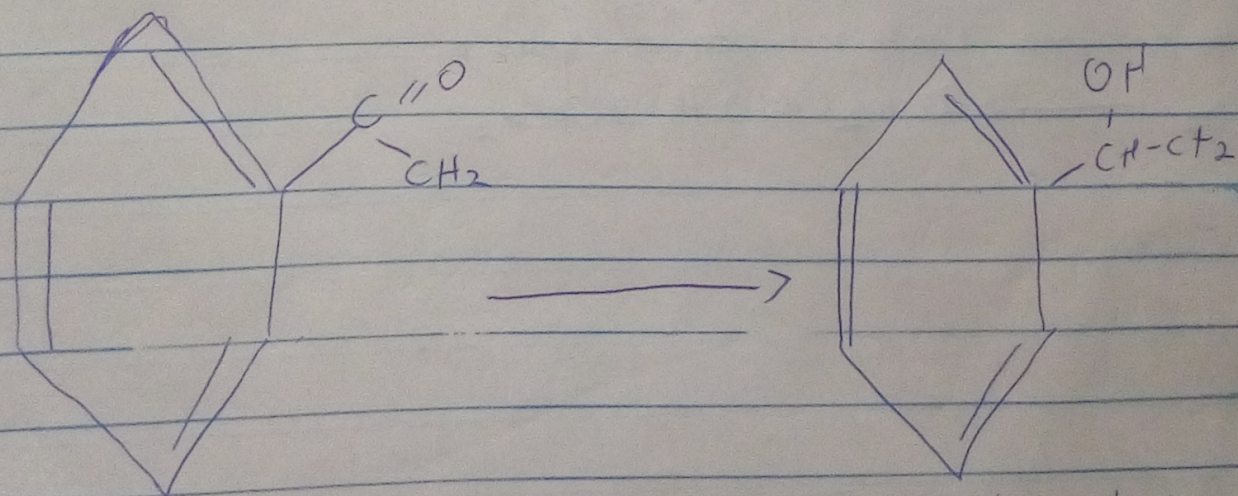
A) Determine the product obtained in the reduction of Alkanone and Alk-  
anal. Use a specific example for each and show the equation of reaction.

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 examples complex metal hydride, such as lithium tetrahydrido aluminium (III) or sodium tetrahydroborate (III).



Aldehyde

primary Alcohol



ketone

secondary alcohol