Thechava Nnabueze Wilson
19/MHS01/198
MBBS
CHM102 Assignment

1 There are 2 classes of alcohols.
The first class is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If there are two or three hydrogen atoms attached to the hydroxyl bearing carbon atom, it is called a primary alcohol (1°), if there is only one hydrogen atom attached to the carbon atom bearing the hydroxyl group, it is regarded as a secondary alcohol (2°) and when there is no hydrogen atom attached to the carbon bearing the -OH group, it is a tertiary alcohol (3°) 1° = methanol, 1° = propan-2-ol, 3° = methylpropan-2-ol
The second class is based on the number of hydroxyl groups they possess. Monohydric alcohol have only one -OH group present in the alcohol structure, dihydric (glycol) have two -OH group while trihydric has three hydroxyl groups present in the structure. There are also polyhydric alcohols that have more than three -OH groups present. monohydric - propanol, dihydric - ethane-1,2-diol trihydric - propane-1,2,3-triol, polyhydric - heptane-2,3,4,5,6-pentol

2 Alcohols are organic compound and thus all monohydric alcohols are soluble in organic solvents. Lower alcohols that have up to three carbon atoms in their molecules are soluble in water. This is because they can form hydrogen bonds with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.

3 The three steps in the industrial preparation of alcohol are as follows

- Carbohydrates are a major group of natural compounds that can be made to yield starch through the process of **fermentation**. The biological catalyst found in yeast break down the carbohydrate molecules producing ethanol to give a yield of 95%. The starch containing materials i.e potatoes, cereals etc are warmed with malt to 60°C for a specific period of time and are converted into maltose by the enzyme **diastase** which is in malt

$$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow{60^\circ C/\text{diastase}} nC_{12}H_{22}O_{11}$$

carbohydrate → maltose

Maltose is then broken into glucose on addition of yeast which contains the enzyme maltase and at 15°C.

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{15^\circ C/\text{maltase}} 2C_6H_{12}O_6$$

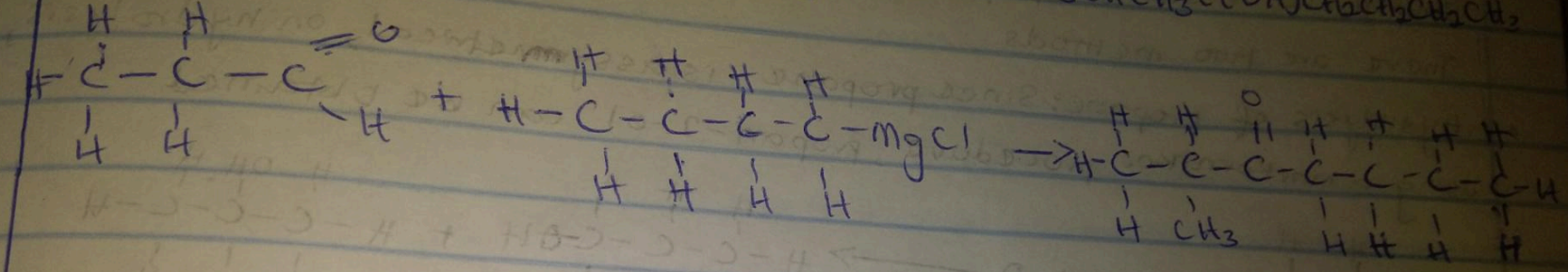
maltose → glucose

Then, glucose at a constant temperature of 15°C is converted into alcohol by the enzyme **zymase** which is also in yeast

$$C_6H_{12}O_6 \xrightarrow{15^\circ C/\text{zymase}} 2CH_3CH_2OH + 2CO_2.$$

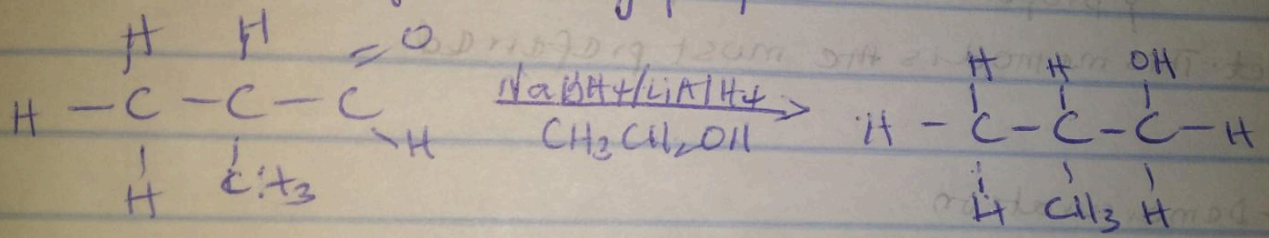
glucose → ethanol

4 $CH_3CHCH_3CHO + CH_3CH_2CH_2CH_2-MgCl \longrightarrow CH_3CHCH_3C(OH)CH_2CH_2CH_2CH_3$



7 Reduction of 2-methylpropanal

a



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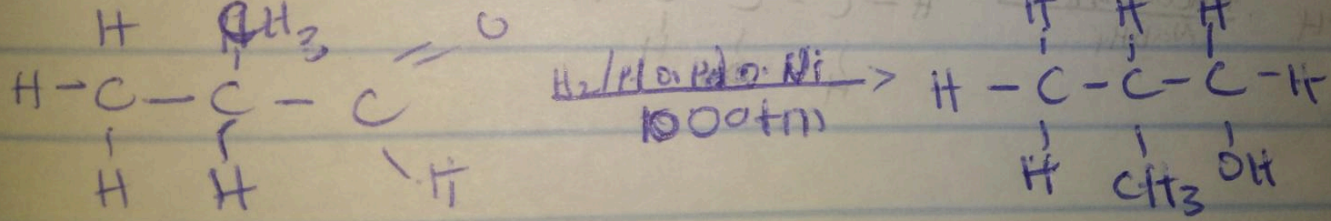
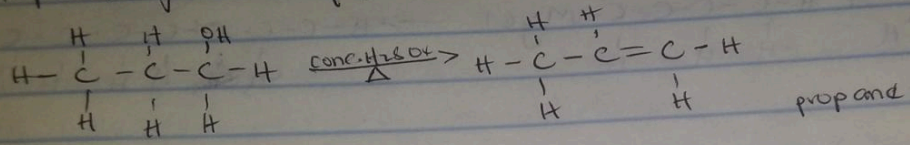


8) Conversion of propan-1-ol to propan-2-ol

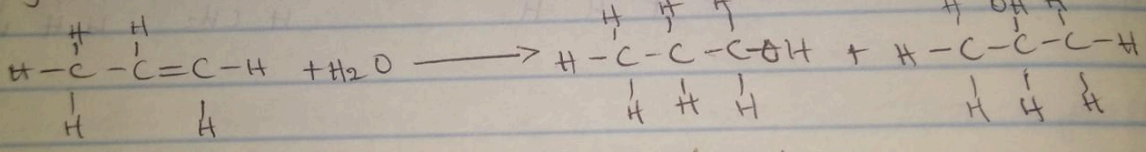
Step I: Dehydration of propan-1-ol to propane using conc. H_2SO_4



Step II: conversion to propan-2-ol

There are two methods

A) Hydrolysis of propane: Since propane is assymetrical, on hydrolysis, using a markovnikov procedure, propan-2-ol can be obtained



Both propan-1-ol & propan-2-ol are produced though propan-2-ol is the main product. This method is the most preferred

B) Oxymercuration - Demercuration