

NAME: OKOH ELIJAH FEROMOSELE AYOMIKUN

MATRIC NO: 19/ENG05/048

DEPT: MECHATRONICS ENGINEERING.

SUBJECT: CEM 102 ASSIGNMENT

SIGN: 

(1) Discuss the two major classification of Alkanols - Give 2 Examples each for each class.

\* Organic compounds containing hydrogen, oxygen and carbon.

General formula:  $C_nH_{2n+1}OH$

Classification of Alcohol:

(1) BASED ON THE NUMBER OF HYDROGEN ATTACHED TO THE CARBON CARRYING THE (OH) GROUP:

(a) Primary Alcohol  $\Rightarrow$  propanol, Butanol.

(b) Secondary Alcohol  $\Rightarrow$  Butan-2-ol, propan-2-ol

(c) Tertiary Alcohol  $\Rightarrow$  2-methyl propan-2-ol, 3-Ethyl Hexan-3-ol

(2) NUMBER OF (OH) FUNCTIONAL GROUP PRESENT IN THE COMPOUND

(a) 1(OH)  $\rightarrow$  Monohydric Alcohol  $\rightarrow$  propanol, Butanol.

(b) 2(OH)  $\rightarrow$  Dihydric Alcohol  $\Rightarrow$  1,2-Ethandiol, 1,3-propanediol.

(c) 3(OH)  $\rightarrow$  Trihydric Alcohol  $\rightarrow$  1,2,3-Propanetriol, 1,2,3-Butanetriol

(2) Solubility of Alcohol: Lower Alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.

All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with water molecules.

(3) Discuss the Industrial Manufacture of ethanol showing all reactions equation and necessary enzymes and temperature of reactions.

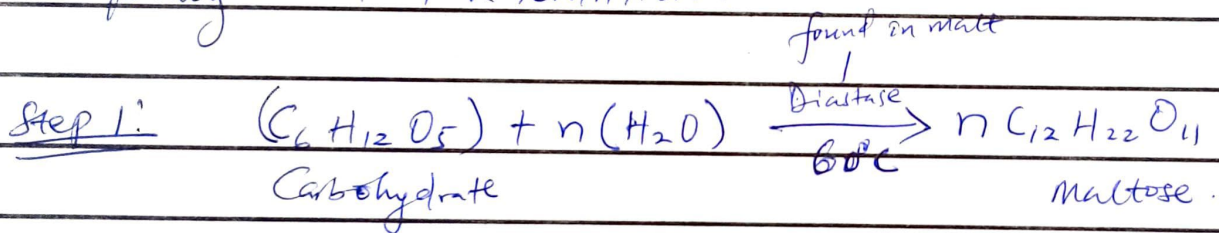
### Production of Ethanol

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

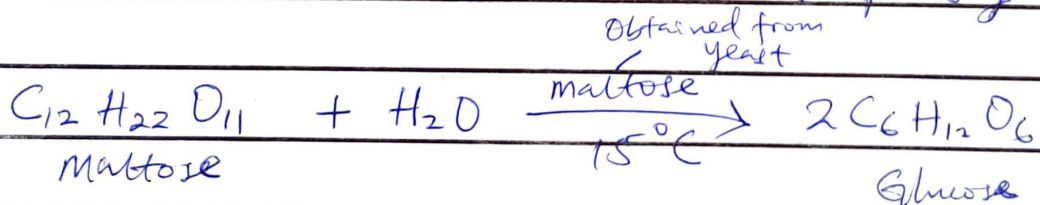
The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The

starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to  $60^{\circ}\text{C}$  for a specific period

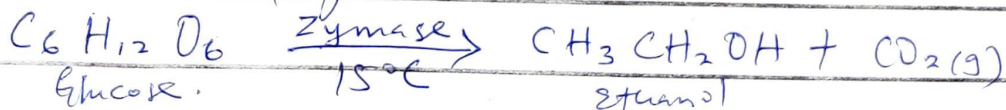
of time are converted into maltose by the enzyme diastase contained in the malt. This continuous reaction is shown below and colloquially called "FERMENTATION".



Step 2: Maltose must be broken down into simple sugar.

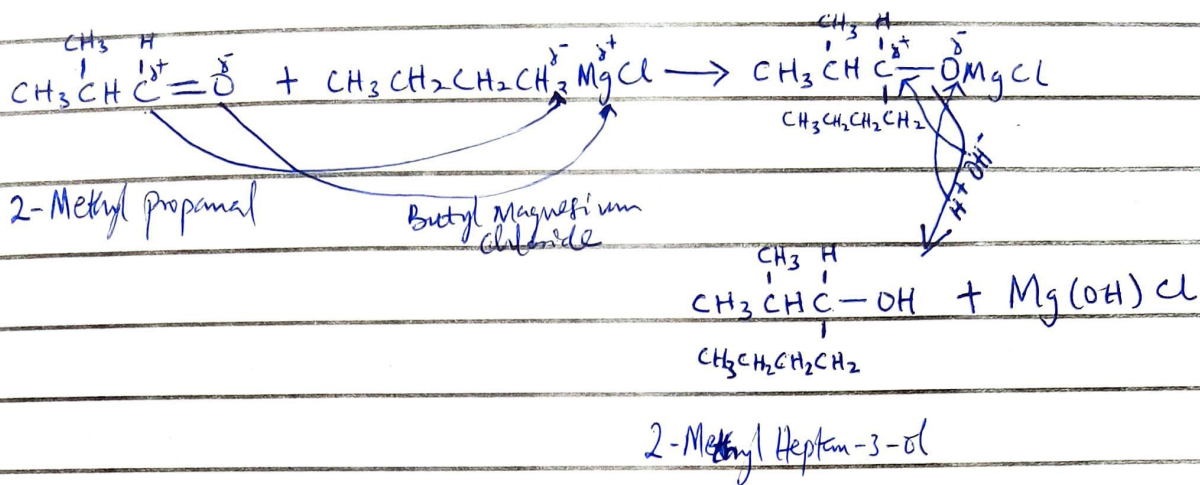


Step 3: Conversion of glucose to ethanol

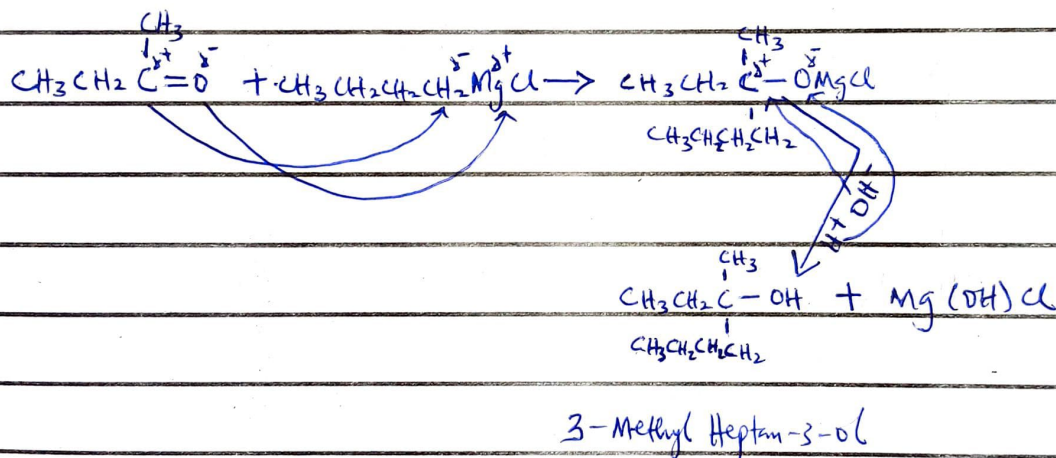


Step 4: Reaction is complete.

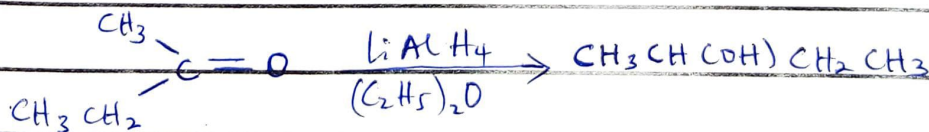
(4) Show the reaction between 2-Methyl propanal and butyl magnesium chloride; Hint: Grignard Synthetic.



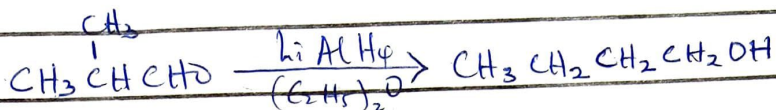
(5) Show the Reaction between 2-Methyl propanone and butyl magnesium chloride.



(6) Show the Reduction of 2-methyl propanone.



(7) Show the reduction of 2-methyl propanal



(8) propose a scheme for the conversion of propan-1-ol to propan-2-ol

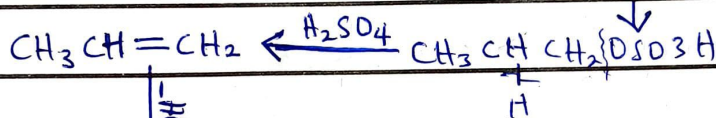
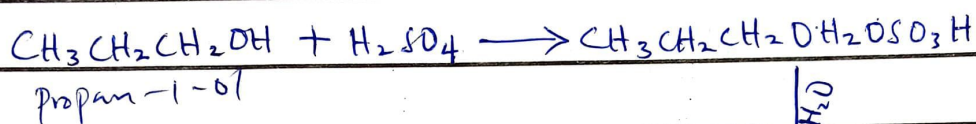
(1) Addition of Tetraoxosulphate(VI) Acid

(2) Removal of  $\text{H}_2\text{O}$

(3) Removal of  $\text{H}_2\text{SO}_4$

(4) Hydrolysis

In equation format:



Propan-2-ol