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19/MHS01/344

MEDICINE AND SURGERY

QUESTION 1

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

Answer

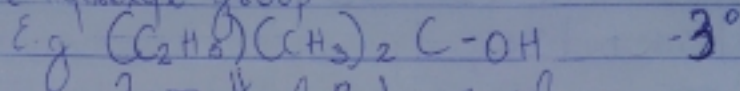
The two major classifications of Alkanols are

1. Based on the number of hydrogen atoms attached to the carbon carrying the hydroxyl group. There are 3 classes in this method.
 - a. Primary Alkanols: These alkanols have two or three hydrogen atoms attached to the carbon carrying the hydroxyl group.
E.g. $\text{CH}_3\text{CH}_2\text{OH}$ (Ethanol) 1°
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (Propanol) 1°

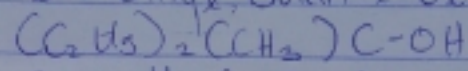
- b. Secondary Alkanols: These alkanols have one hydrogen atom attached to the carbon carrying the hydroxyl group.
E.g. $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$ (Pentan-3-ol) 2°
 $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ (Propan-2-ol) 2°

- c. Tertiary Alkanols: These alkanols have no hydrogen atom attached to the carbon carrying

the hydroxyl group



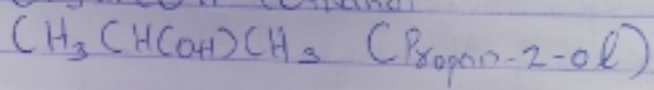
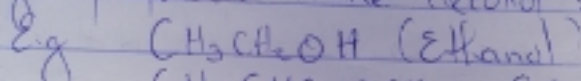
2-methyl, Butan-2-ol



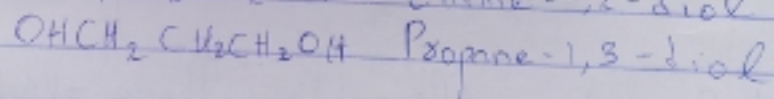
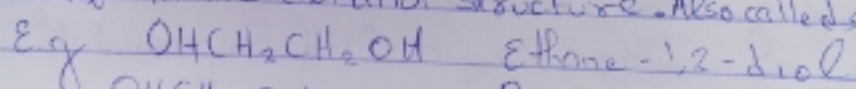
3-methyl, Pentan-3-ol

2 The second classification is based on the number of hydroxyl groups a compound possesses. There are ~~three~~ ^{four} groups under this class.

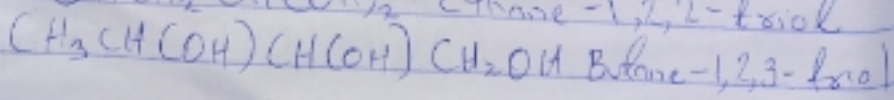
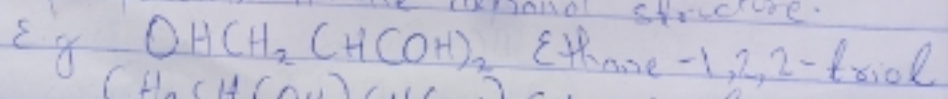
a Monohydric alcohols: These have just one hydroxyl group present in the alcohol structure



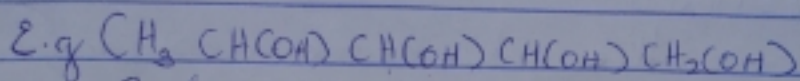
b Dihydric alcohols: These have two hydroxyl groups present in the alcohol structure. Also called glycols



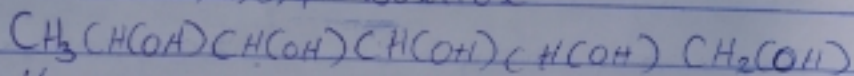
c Trihydric alcohols: These have three hydroxyl groups present in the alcohol structure.



d Polyhydric alcohols: Polyols have more than 3 hydroxyl groups in the alcohol structure



Pentan-1,2,3,4-Butriol

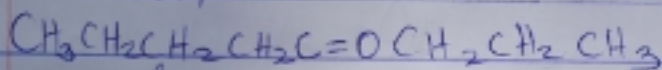


Hexan-1,2,3,4,5-Pentriol

Question 2

In the Grignard synthesis of alkanols, react a named Grignard reagent with $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{O}$
 $\text{CH}_2\text{CH}_2\text{CH}_3$ showing the reaction steps

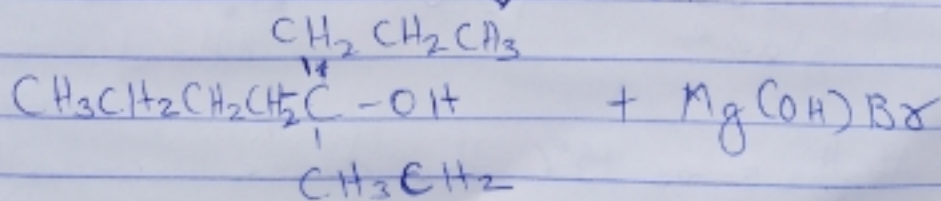
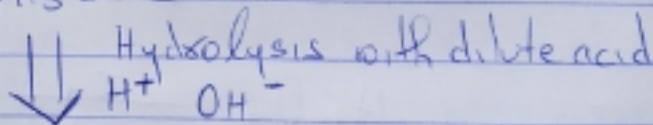
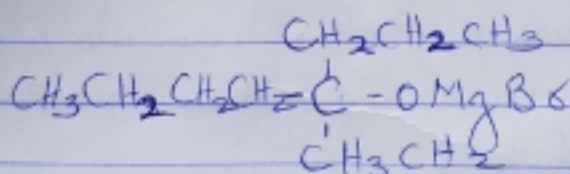
ANSWER



Octan-5-one
 (ketone)

+ $\text{CH}_3\text{CH}_2\text{MgBr}$
 ethylmagnesium
 bromide

(Grignard reagent)



4-ethyl, Octan-4-ol

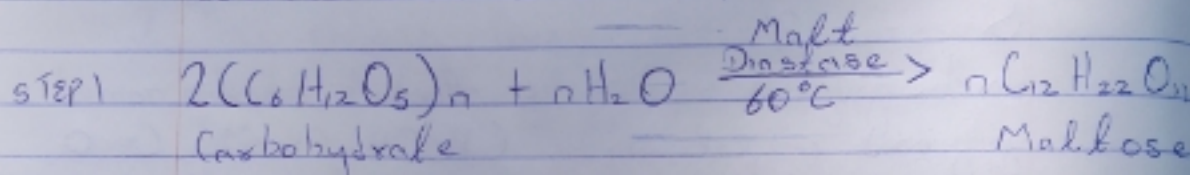
Magnesium hydroxy
 bromide

QUESTIONS

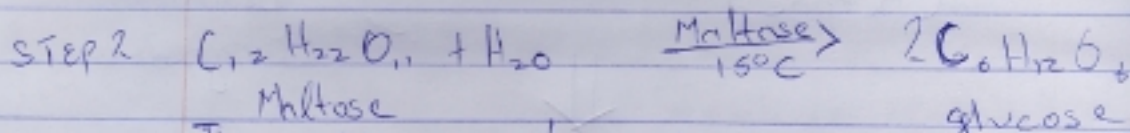
Discuss the industrial manufacture of ethanol showing all reaction equations necessary and necessary enzymes and temperature of reaction.

ANSWER

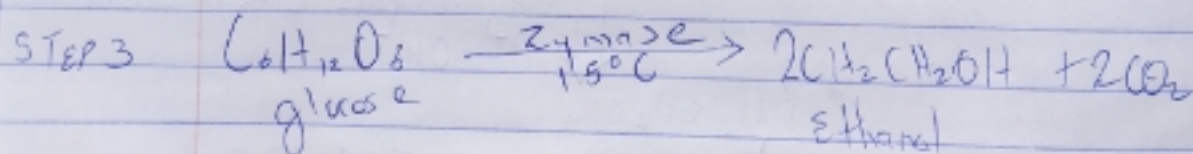
Ethanol is produced industrially from carbohydrate sources such as starch.



The carbohydrate here gotten from starch containing compounds is warmed with malt which contains diastase for a period at $60^\circ C$ to produce maltose.



The maltose is broken down into glucose with yeast added which contains maltase to break it down into glucose at $15^\circ C$.



At the same $15^\circ C$ the glucose is converted to ethanol by zymase - an enzyme also found in yeast.

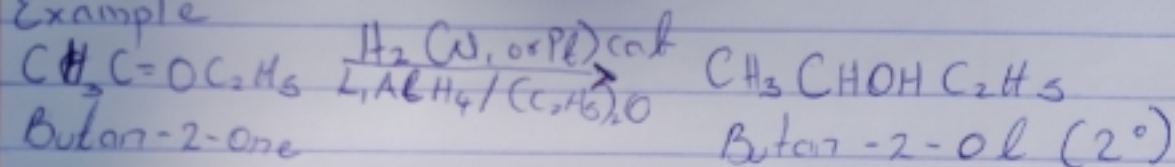
QUESTION 4

1 Determine the product obtained in the reduction of alkanone and alkanal. Using specific examples for each and showing equation of reaction.

ANSWER

a Alkanones also called ketones are reduced to alcohols with normal reducing agents e.g LiAlH_4 or $(\text{C}_2\text{H}_5)_2\text{O}$

Example



b Alkanals (Aldehydes) will reduce under normal reducing agents or in presence of hydrogen with platinum or nickel catalyst to give a primary alcohol

Example

