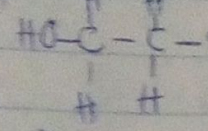
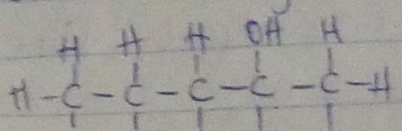
ii Dihydric alkanol: Also called Glycols, they have two hydroxyl groups present in the alkanol structure. e.g

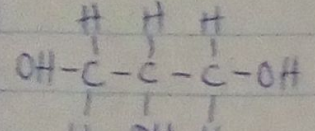


Ethane-1,2-diol

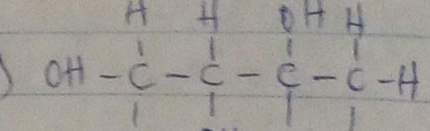
b) 

pentane-2,4-diol.

iii Trihydric alcohols: Also called triols, have three hydroxl groups present in the structure of the alkanol e.g



propan-1,2,3-triol

b) 

Butan-1,2,3-triol.

2 Grignard synthesis of Alkanols

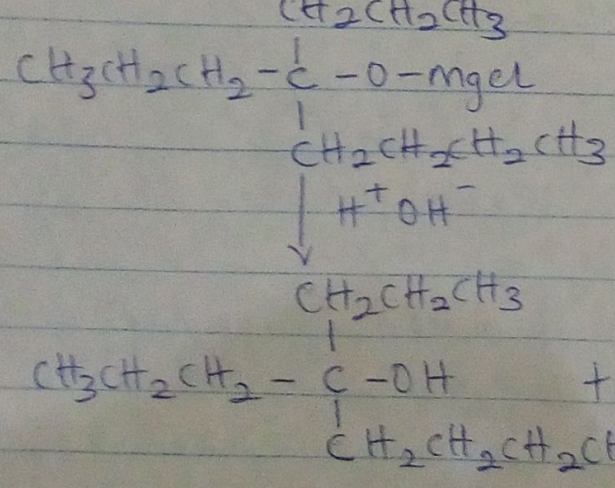
Grignard reagent- C_2H_5MgBr

$CH_3CH_2CH_2CH_2-C=O\,CH_2CH_2CH_3$ ~~+ C2H5MgBr → C4H9~~

$CH_3CH_2CH_2MgCl + CH_3CH_2CH_2CH_2C=O\,CH_2CH_2$

$CH_3CH_2CH_2MgCl + CH_3CH_2CH_2CH_2C=O$

↓ diethyl ether



$CH_3CH_2CH_2-C(CH_2CH_2CH_3)(CH_2CH_2CH_2CH_3)-O-MgCl$

↓ H^+OH^-

$CH_3CH_2CH_2-C(CH_2CH_2CH_3)(CH_2CH_2CH_2CH_3)-OH + Mg(OH)Br$

3 Industrial manufacture of Ethanol

Carbohydrates such as starch are major groups 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%. On warming starch with malt to 60° for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.

step 1:

$$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow[\text{malt/60°C}]{\text{Diastase}} n(C_{12}H_{22}O_{11})$$

carbohydrate → maltose

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°.

step 2:

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow[15°C]{\text{maltase}} 2C_6H_{12}O_6$$

maltose → glucose

The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme zymase contained also in yeast

step 3:

$$C_6H_{12}O_6 \xrightarrow[15°C]{\text{zymase}} 2CH_3CH_2OH + 2CO_2$$

Glucose → Ethanol

4. Alkanone. Reduction of alkanone gives secondary alkanol

$$CH_3C_2H_5-C=O \xrightarrow[LiAlH_4]{} CH_3C_2H_5CHOH$$

(2°) alcohol

Alkanals. Reduction of Alkanals gives primary alkanols

$$CH_3CH_2CH=O \xrightarrow[LiAlH_4/H_2O]{} CH_3CH_2CH_2OH$$

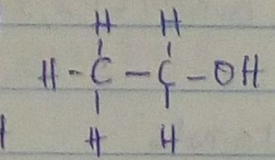
ADEDEJI TAIWO AYOBAMI
NURSING Matric: 19/MHS02/003
CHM102 Date: 6/04/2020
Assignment Due date April 14th.

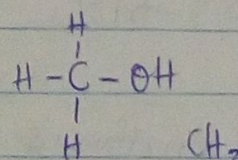
Q Discuss the two major classification of Alkanols. Give two examples each for each class.

A Classification based on the number of hydrogen atom containing the hydroxyl group.

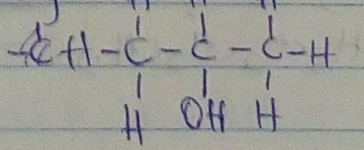
Note: Alkanol has the general molecular formula "R-OH" where "R" is the alkyl group e.g Ethyl $-CH_3CH_2-OH$ etc.
while "-OH" is the hydroxyl group which is the functional group for alkanols. therefore, Alkanols can be classified as follows:

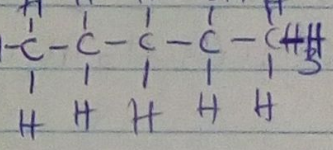
i. primary Alkanol: e.g

a) 
CH_3CH_2OH
Ethanol (1°)

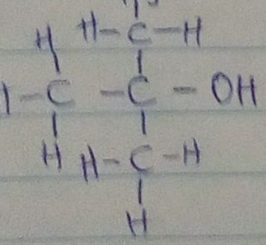
b) 
CH_3OH
Methanol (1°)

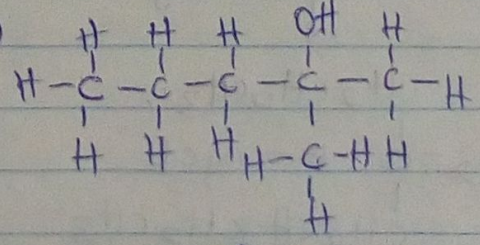
ii Secondary Alkanol: e.g

(a) 
propan-2-ol (2°)

(b) 
pentan-2-ol (2°)

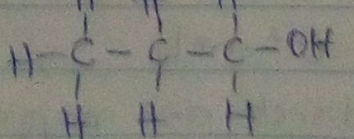
ii Tertiary Alkanol: e.g

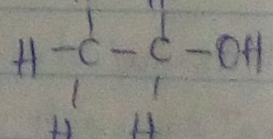

2-methylpropan-2-ol (3°)

b) 
2-methyl pentan-2-ol.

B Classification based on number of hydroxyl groups they possess. therefore, Alkanols can be classified as follows.

i Monohydric alcohols: have one hydroxy group present in the alcohol structure e.g.


propanol

b) 
Ethanol.