NAME:DALAHOL YOP MARY

MATRIC NUMBER: 19/MHS01/132

DEPARTMENT: MBBS

COURSE: CHM 102 {GENERAL CHEMISTRY II}

ASSIGNMENT

1.

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D) Classification of Alcohols.

a) Classification based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group.

if the number of hydrogen atoms attached to the carbon atom bearing the 'OH' group are two or three, it is called a 'primary alcohol (1°)' if it is one hydrogen atom, it is called 'Secondary alcohol (2°)' but if there's no hydrogen attached to the carbon atom, it is called 'tertiary alcohol (3°)'. It is characterized by $>C-OH$] e.g.

i) CH_3CH_2OH - Ethanol (1°)

ii) $CH_3CH(OH)CH_3$ - propan-2-ol (2°)

b) Classification based on the number of (OH) hydroxyl groups they possess.

Monohydric alcohols possess only one hydroxyl group per molecule present in the alcohol structure. Dihydric alcohols have two

hydroxyl groups and are also called Glycols. Trihydric alcohols or triols have three hydroxyl groups in the alcohol structure. Polyhydric alcohols have more than one hydroxyl group.

e.g. i) $CH_3CH_2CH_2OH$ - propanol (monohydric).

ii) $CH_3CH(OH)CH_2CH(OH)CH_2CH_3$ - Hexan-3,4 diol (dihydric)

2) SOLUBILITY OF ALCOHOLS IN WATER AND ORGANIC SOLVENTS

i) **SOLUBILITY IN WATER:** Lower alcohols with upto 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.

ii) **SOLUBILITY IN ORGANIC SOLVENTS:** 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) INDUSTRIAL MANUFACTURE OF ALCOHOLS

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 breakdown the carbohydrate molecules into ethanol to give a yield of 95%.

STEP 1: The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time are converted maltose by the enzyme diastase contained in the malt.

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

carbohydrate — water — maltose

STEP 2: The maltose is broken down into glucose on addition of yeast which contains the enzyme Zymase contained also in yeast which contains the enzyme maltase and at a temperature of 15°C.

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

maltose — water — glucose

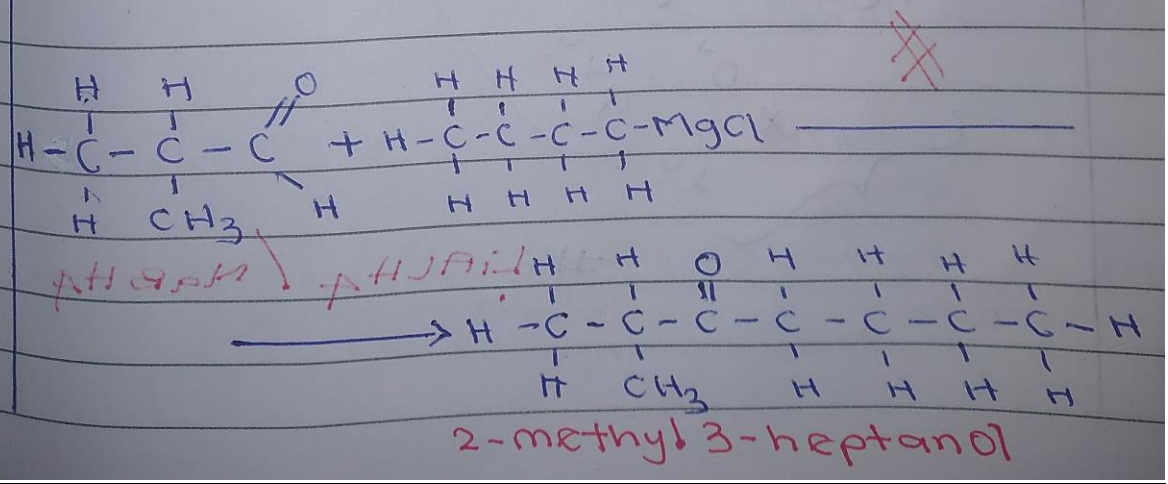
STEP 3: The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast.

$$C_6H_{12}O_6 \xrightarrow[\text{Zymase}]{15^\circ C} 2CH_3CH_2OH + 2CO_2\uparrow$$

glucose — Ethanol — carbon(IV) oxide

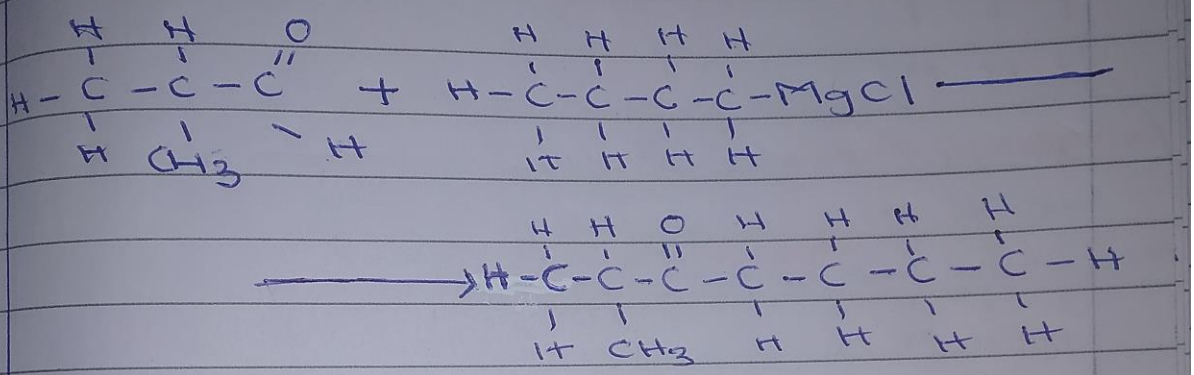
4) REACTION BETWEEN 2-METHYLPROPANAL AND BUTYLMAGNESIUMCHLORIDE
{Grinard Synthesis}

$$CH_3CHCH_3CHO + CH_3CH_2CH_2CH_2MgCl \longrightarrow CH_3CHCH_3C(OH)CH_2CH_2CH_2CH_3$$



2-methyl 3-heptanol

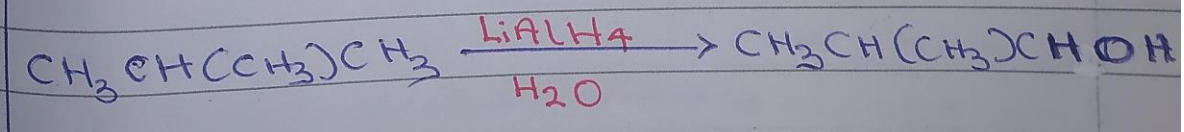
5) REACTION BETWEEN 2-METHYLPROPANONE AND BUTYLMAGNESIUMCHLORIDE{Grinard synthesis}



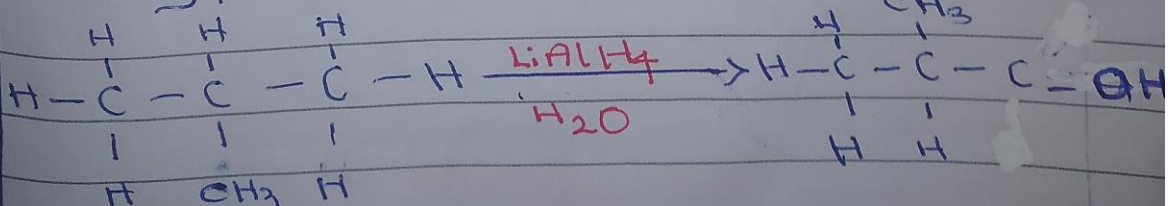
2methyl 5-heptanol

6) REDUCTION REACTION OF 2-METHYLPROPANONE

note: Ketones are reduced into either primary or secondary alcohols.

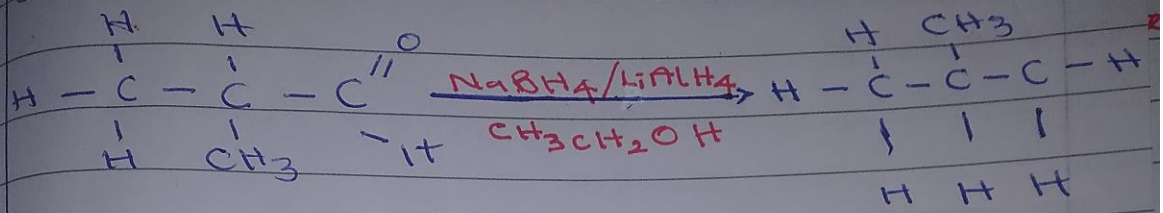


2methylpropanone



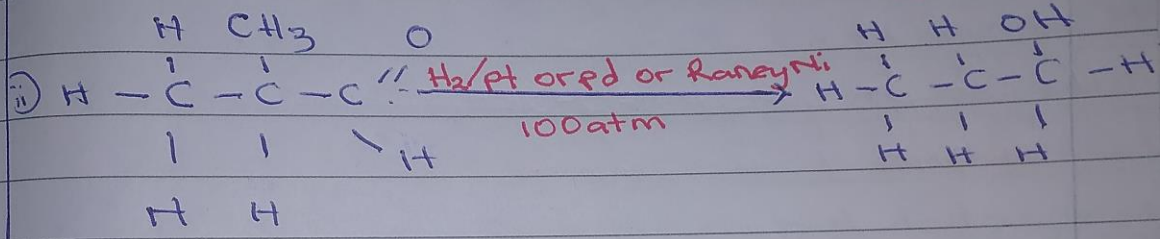
2methylpronanol

(7) REDUCTION OF 2METHYLPROPANAL



2methylpropanol

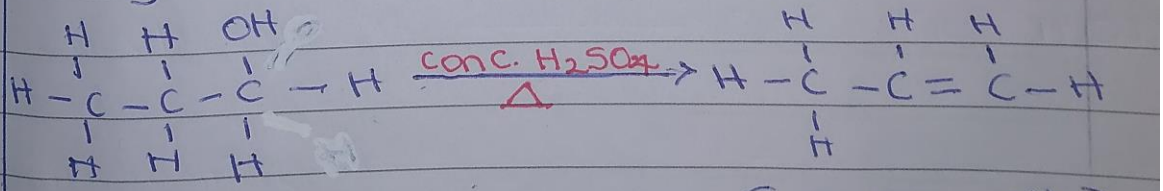
(ii)



(8) CONVERSION OF PROPAN-1-OL TO PROPAN-2-OL

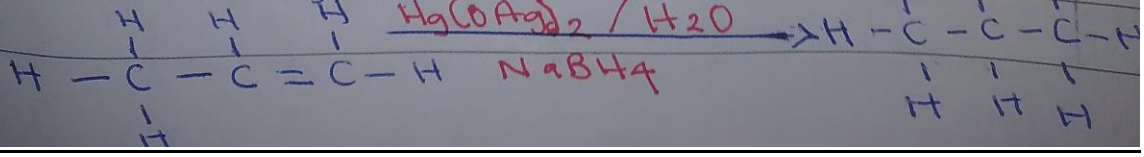
Scheme

STEP 1: dehydration of propan-1-ol to propene using conc. H_2SO_4

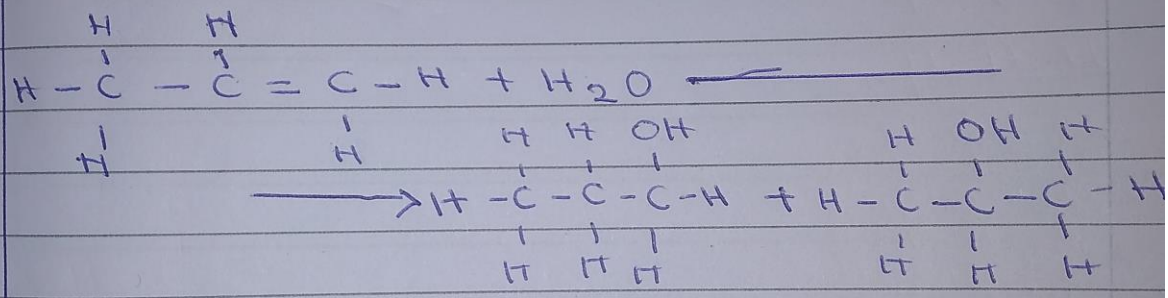


($CH_3CH=CH_2$)

STEP 2 : Oxymercuration



But, Since propene is assymetrical, on hydrolysis using a Markovnikov proced
Propan 2-ol can be obtained



=> 2 products are gotten but following Markovnikov's rule, propan-2-ol will be the major product.