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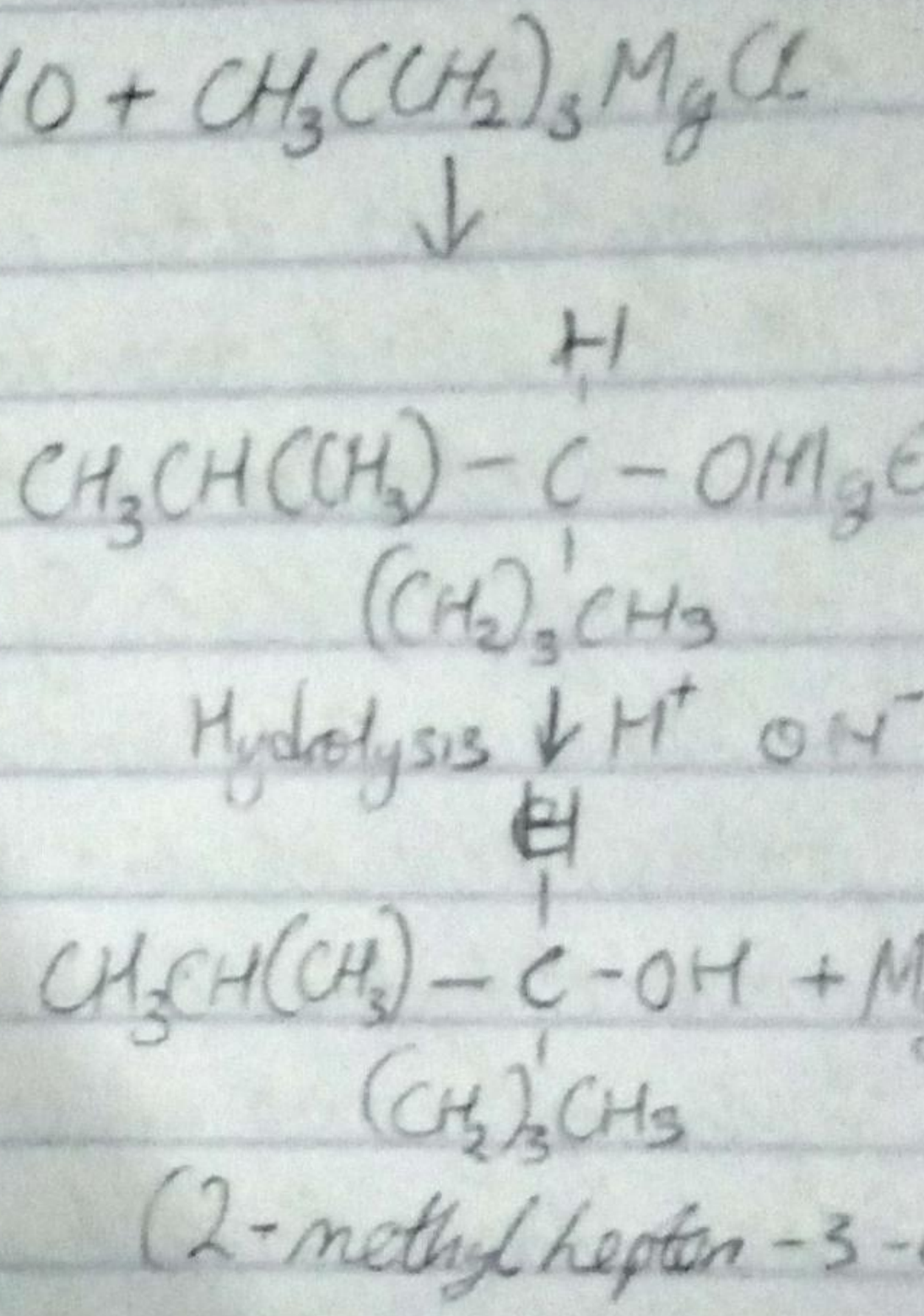
a Based on the nember of hydrogen atoms attached to the Carbon atoms containing the Hydroxyl group 7, the number of hydrogen atom attached to the carbon atom bearing the Hydroxyl group are, three or two. It is called primary alcohol and if no hydrogen atom is attached to the Carbonatom, it is called secondary alcohol and if no hydrogen atom is attached to the Carbonatom and it is called tertiary alcohol. Eg. Methanol, Propan-2-ol.

b Based on the number of hydroxyl group they posses. Monohydric alcohol possess one hydroxyl group dihydric alcohols or glycol possess two hydroxyl group while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol Eg Propanol, Ethane-1-2-diol Propane-1,2,3-triol

2 Lower alcohols with up to three carbon atoms in their molecules are soluble in water because the lower alcohol conform hydrogen bonds with water molecules. The water solubility of alcohol decreases with increasing relative molecular mass

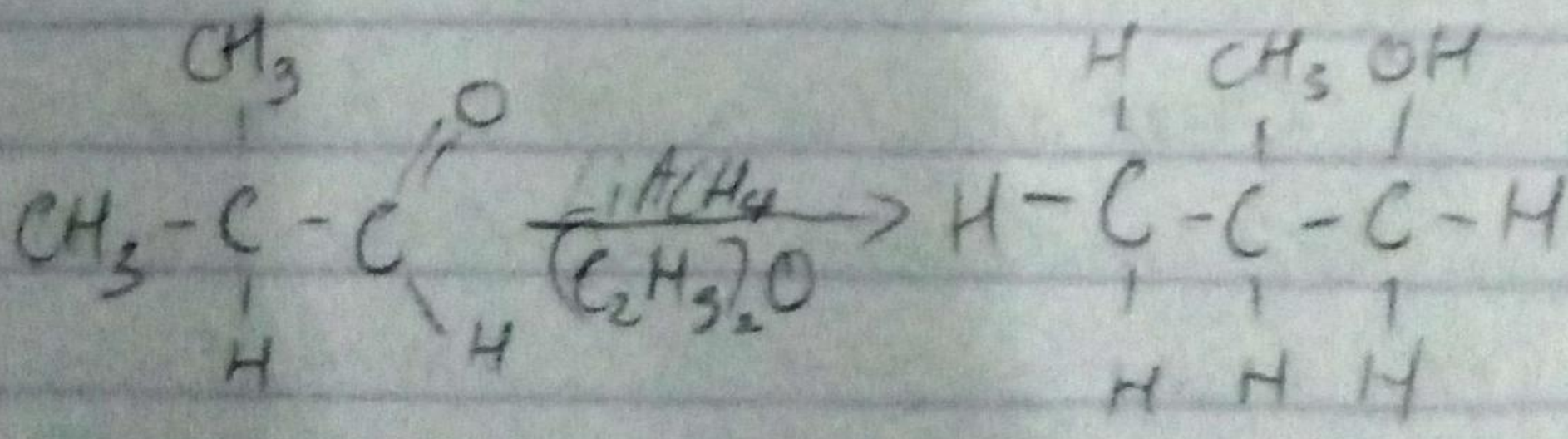
All monohydric alcohols are soluble in Organic solvents. The Solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with water molecules

4 $CH_3CH(CH_3)CHO + CH_3(CH_2)_3MgCl$



(2-methyl heptan-3-ol)

7



2 methyl propanol

3 Carbohydrates such as starch are major groups of natural compounds that can be made to yeild ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yeild of 95%. 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 into 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 — maltose

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase added at a temp of 15°C

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

maltose — glucose

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

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

Glucose — Ethanol

8 $CH_3CH_2CH_2OH \xrightarrow{?} CH_3\underset{\underset{CH}{|}}{C}HCH_3$

Propanol — Propan 2-ol

Dehydrate propanol by using conc. H_2SO_4

$CH_3CH_2CH_2OH + H_2SO_4$

↓

$CH_3CH_2CH_2OH_2OSO_3H$

↓ $-H_2O$

$CH_3CH_2CH_2OSO_3H$

↓ $-H_2SO_4$

$CH_3CH=CH_2$

↓ $+H_2O$

$CH_3\underset{\underset{OH}{|}}{C}HCH_3$