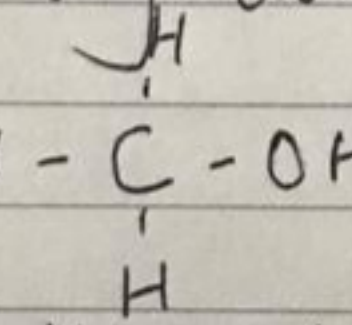
1. Alcohols can be classified based on;

i. Number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. eg If ~~one~~ hydrogen atom is attached it is called a tertiary alcohol, one hydrogen atom attached is a secondary alcohol (2°) and two or three hydrogen atoms attached is called primary alcohol (1°) e.g

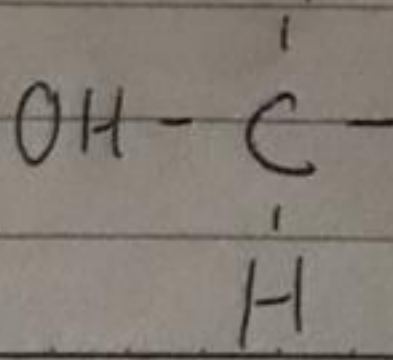
$CH_3OH \rightarrow$



Methanol (1°)

ii. Number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group, dihydric alcohols/glycols have two hydroxyl groups while trihydric alcohols or triols have three hydroxyl groups present.

Example:



→ Ethan, 1-2, diol Dihydric alcohol.

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2. Water

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.

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.

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3. Manufactwe of fthanol Industrially Starch containing materials including molasses, potatoes, cereals, rice are warmed with malt at 60°C for a specific period of time and 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 and at a temperature of 25°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 temperatwe of 25°C is then converted into alcohol by the enzyme Zymase contained also in yeast.

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

Glucose → fthanol

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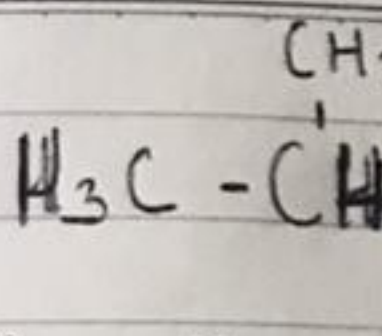
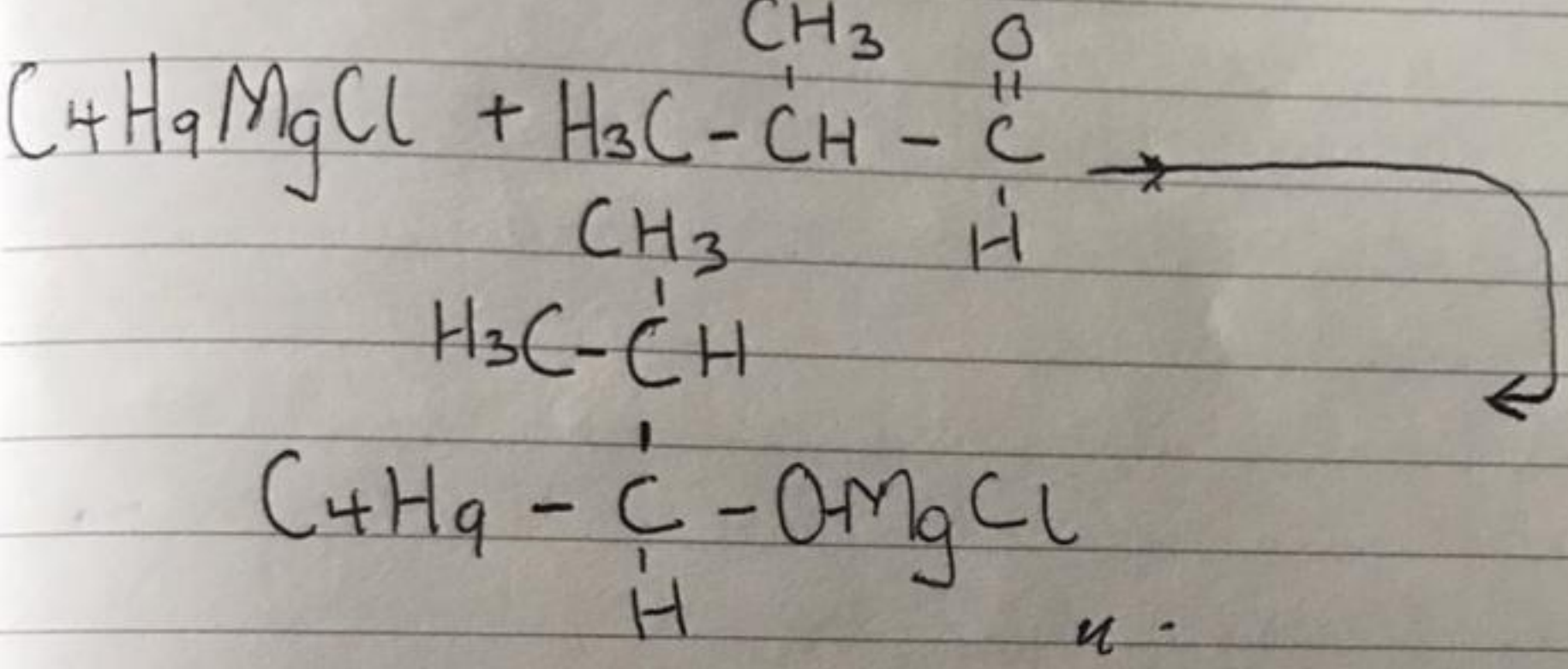
4.

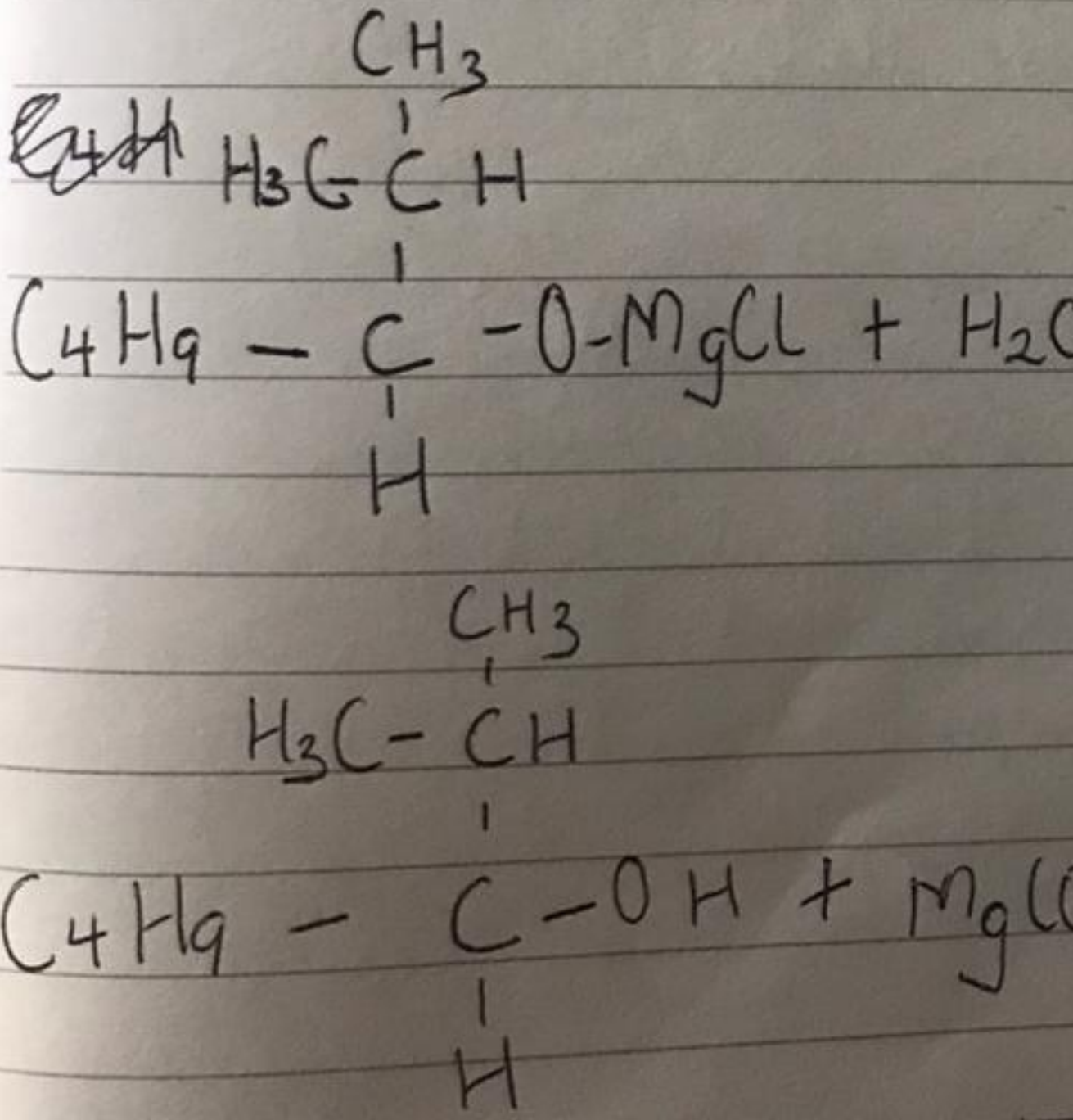


2-methyl propanal

C_4H_9-MgCl

Butyl magnesium chloride





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7. Reduction of 2-methyl propanal:

$$H_3C-\overset{CH_3}{\overset{|}{C}}H-\underset{H}{\overset{O}{\overset{\|}{C}}} \xrightarrow{LiAlH_4} H_3C-\overset{CH_3}{\overset{|}{C}}H-CH_2OH$$

2-methyl propan-1-ol.

8i. Dehydration of propan-1-ol

$$CH_3CH_2CH_2OH \xrightarrow{conc.\ H_2SO_4} CH_3CH=CH_2+H_2O$$

ii. Hydrolysis of propene

$$CH_3-CH=CH_2 \xrightarrow{H_2O} CH_3-CH_2-OH-CH_3$$

Propene is hydrolyzed to propan-2-ol in accordance with Markownikoffs addition which states that in an unsymmetrical reagent the negative part of the reagent gets attached itself to the carbon atom of the alkene which has less number of hydrogen atoms.