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CHEM 102

1) Discuss the two major classification of Alcohols two examples for each class

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

E.g

$\text{CH}_3\text{OH}$  (Methanol (1°))

$\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$  Propan-2-ol (2°)

b) Classification based on the number of hydroxyl group they possess

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  Propanol (Monohydric alcohol)

$\text{HOCH}_2\text{CH}_2\text{OH}$  Ethane-1,2-diol (Dihydric alcohol)

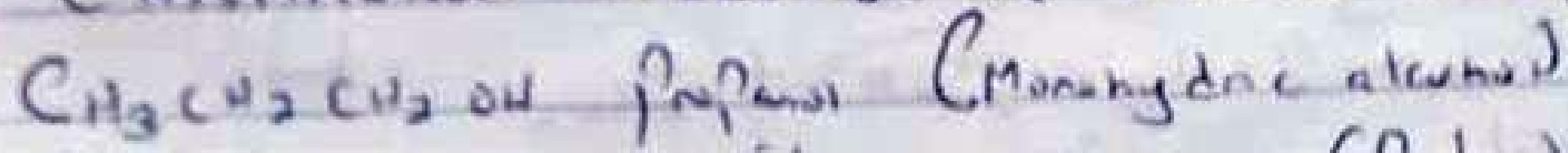
2) In the Grignard synthesis of Alcohols react a named Grignard

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

E.g



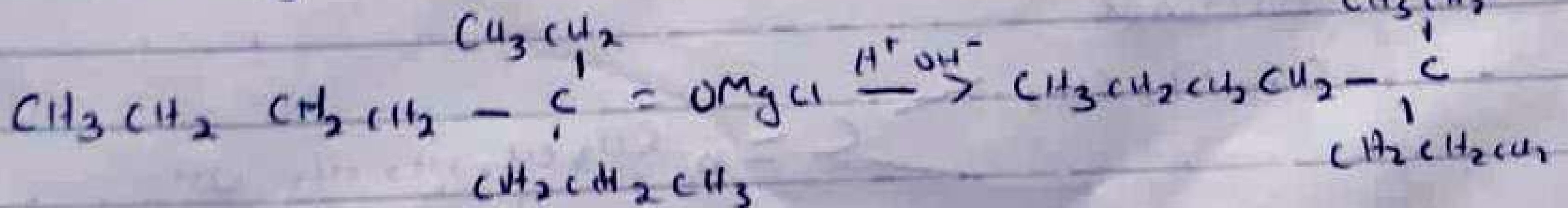
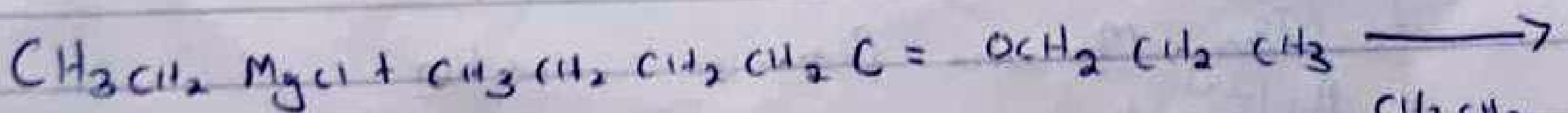
b) Classification based on the number of hydroxyl groups they possess



② In the Grignard synthesis of Alcohols react a named Grignard

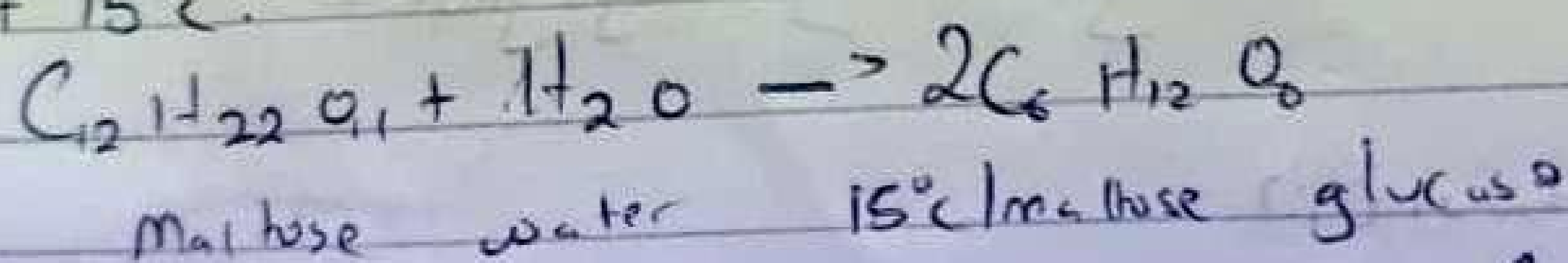
reagent with  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$

Grignard reagent =  $\text{CH}_3\text{CH}_2\text{MgCl}$  (Ethyl magnesium chloride)

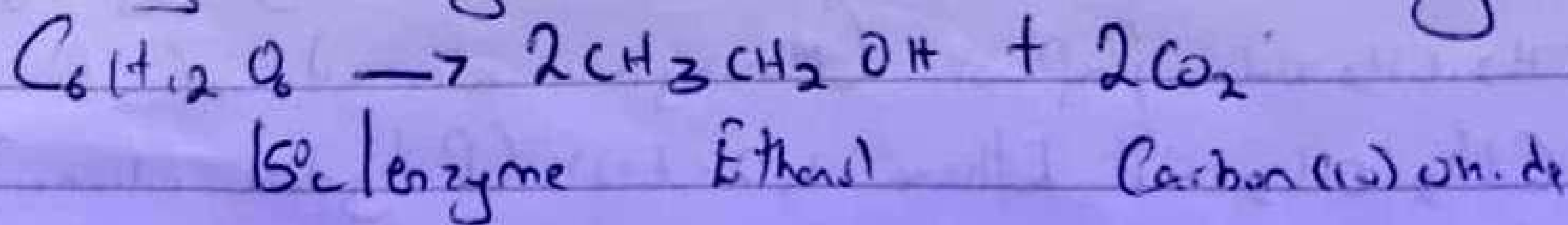


to maltose by the enzyme diastase containing malt  
 $2C_6H_{10}O_5 + nH_2O \rightarrow nC_{12}H_{22}O_{11}$   
 Starch water maltose

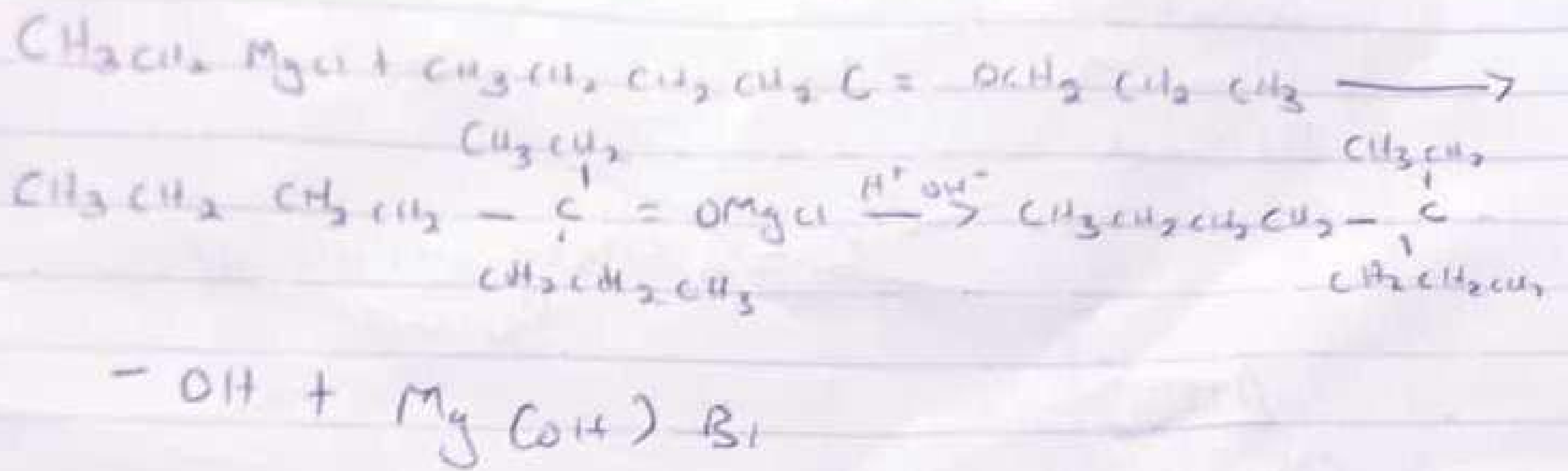
\* The maltose is then broken down to glucose by adding yeast which contains enzyme maltase. it is done at a temperature of  $15^\circ C$ .



glucose is then converted to alcohol at a constant temperature of  $15^\circ C$  by an enzyme zymase which is found in yeast



Werner's reagent =  $\text{CH}_3\text{CH}_2\text{MgCl}$  (ethyl magnesium chloride)



③ Describe the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction. Starch are major group of natural compounds that yield ethanol by fermentation. The biological catalyst breaks down the carbohydrate molecules into ethanol to give 95% yield.

\* Starch containing materials like cereals are warmed with malt to 60°C for a specific period of time. It is then converted

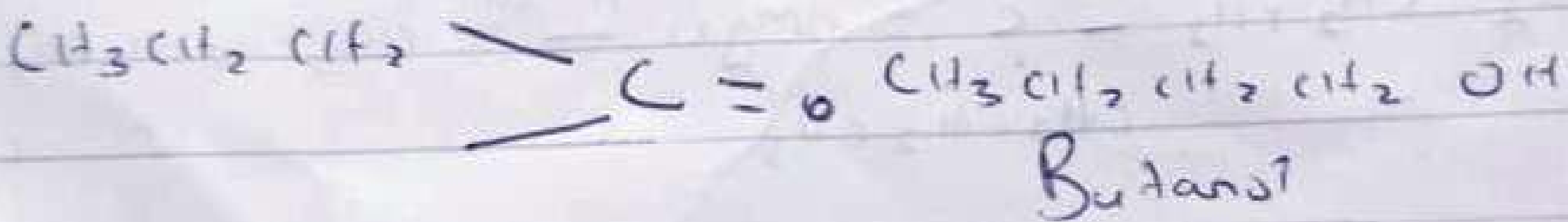
$\text{C}_4\text{H}_8$        $\text{C}_2\text{H}_4$        $\text{C}_2\text{H}_5\text{OH}$        $\text{C}_4\text{H}_9\text{OH}$   
 Isobutylene      Ethanol      Carbonium

4) Determine the product obtained in the reduction of alkanone and alkanal. Use a specific example for each and show the equation of reaction.

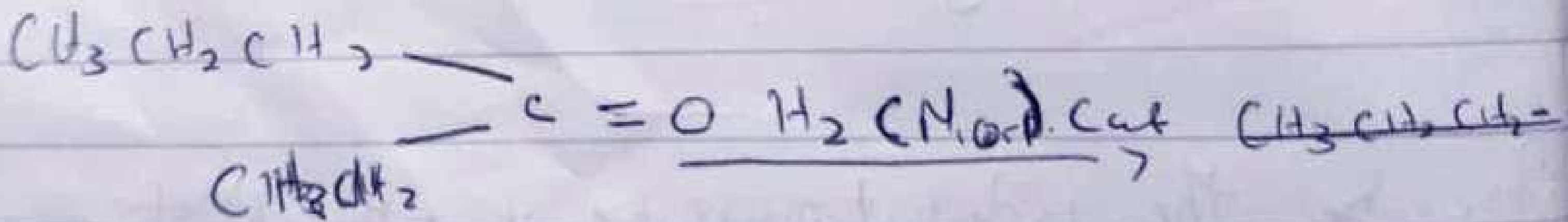
Solution

Using Marwell-Pinner reaction

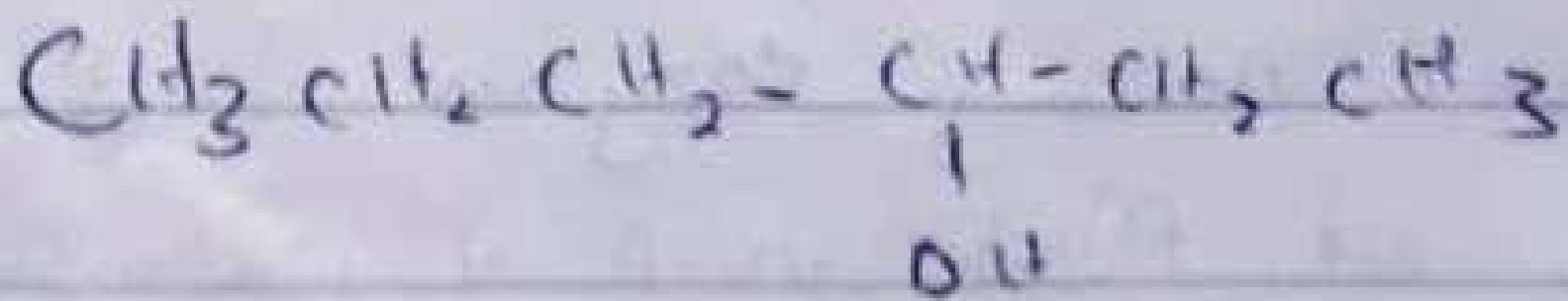
Alkanal



Alkanone



Hexan-3-ol



Hexan-3-ol