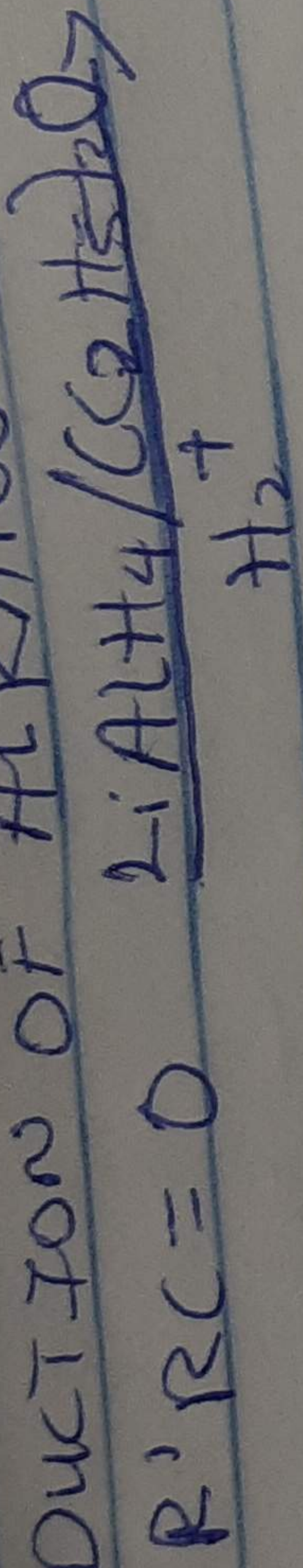


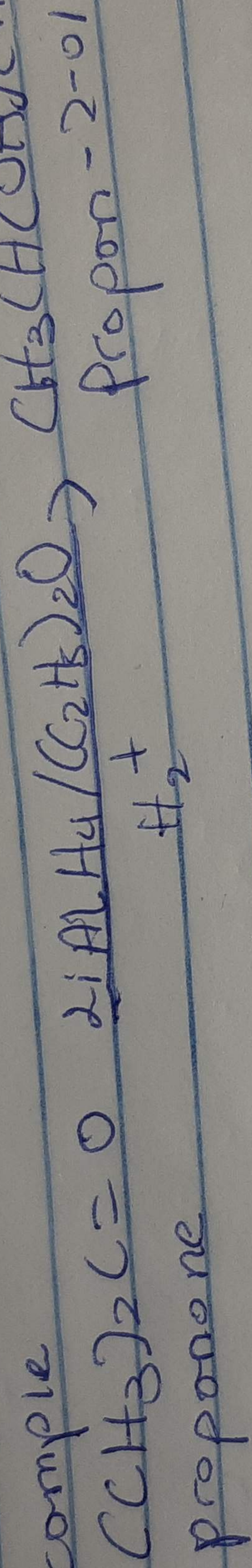
b) REDUCTION OF ALKANONES  $R' R'' CHOH$



Secondary alcohol

Alkanone

Example



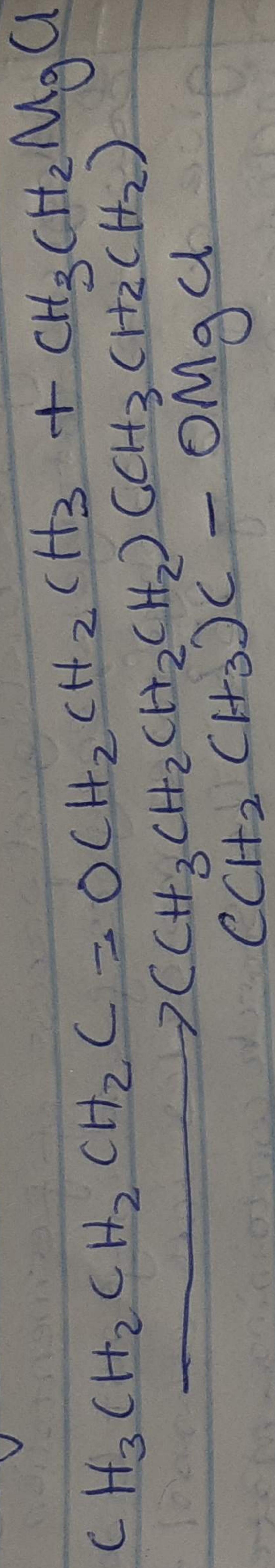
Propan-2-ol

propanone

2. In the Grignard synthesis of Alkanols, react a named Grignard reagent with  $\text{C}_2\text{H}_5\text{COCH}_2\text{C}_2\text{H}_5$   $\text{OCH}_2\text{CH}_2\text{CH}_3$ . Show the reaction steps.

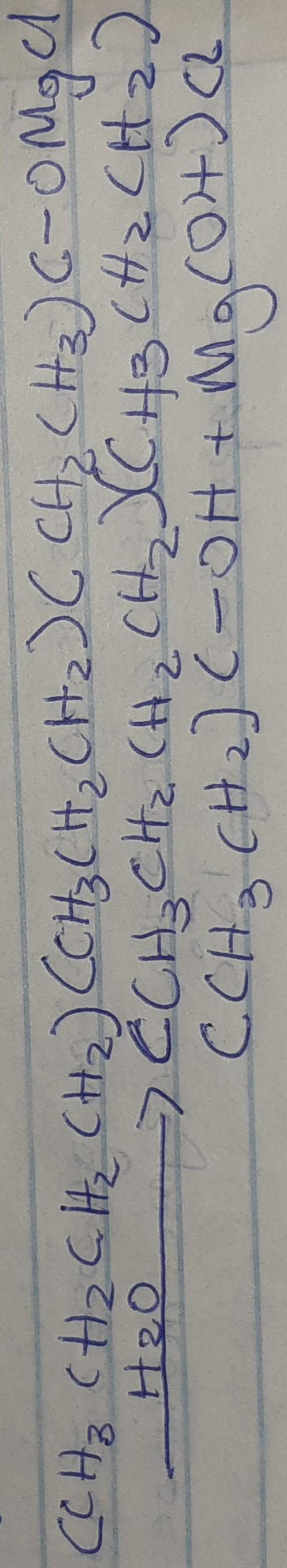
STEP 1:

The reaction of the ketone with a Grignard reagent,  $\text{RMgX}$  where R can be an alkyl group.



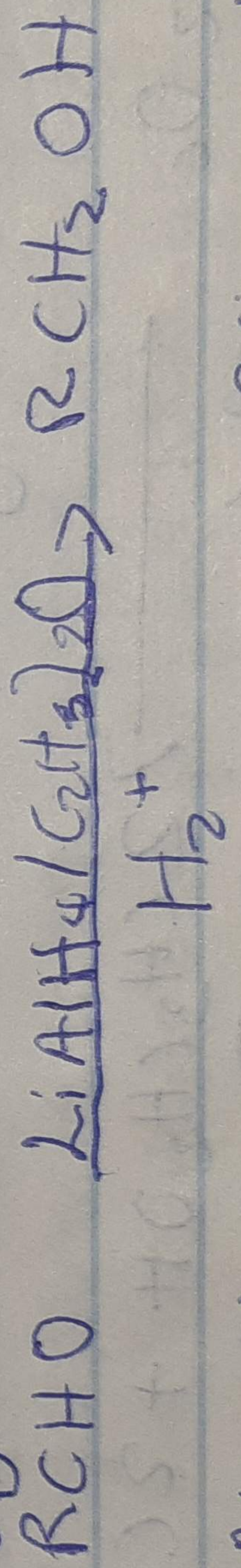
STEP 2:

The intermediate alkylmagnesium chloride is hydrolyzed with dilute acid which would lead to the yield of an alcohol.



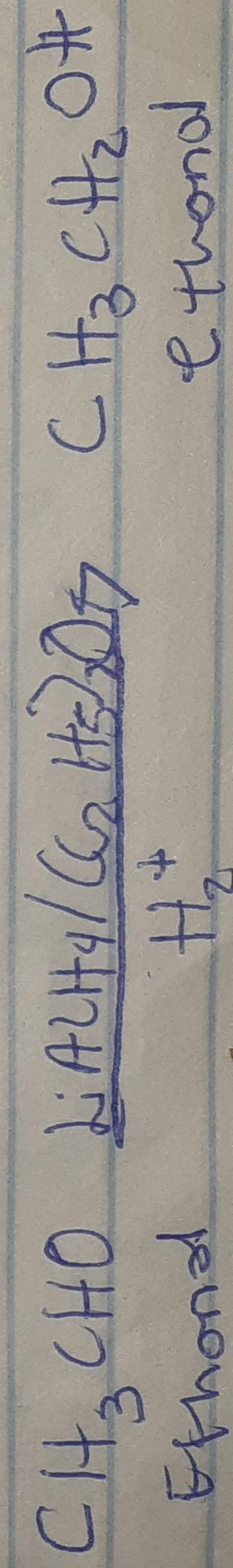
4. Determine the product obtained in the reduction of Alkanone and Alkanol. Use or specific example for each and show the equation of reaction.

a) REDUCTION OF ALKANAL



Alkanol

Example

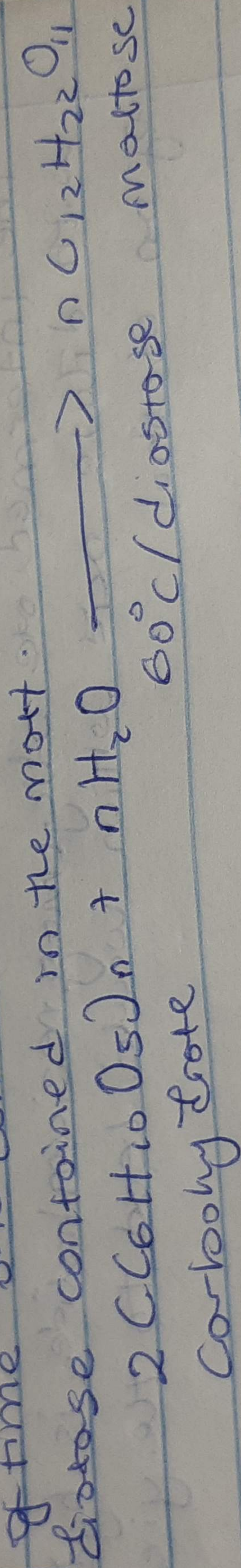


Primary alcohol

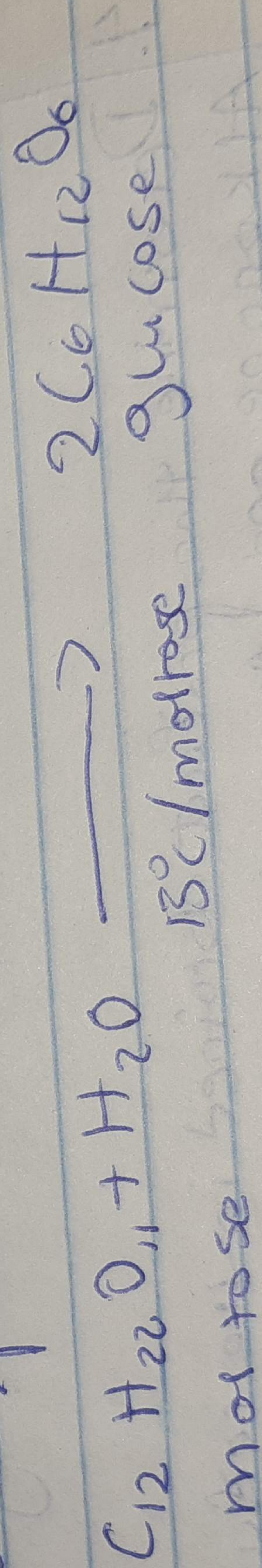
3. Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction.

Production of Ethanol

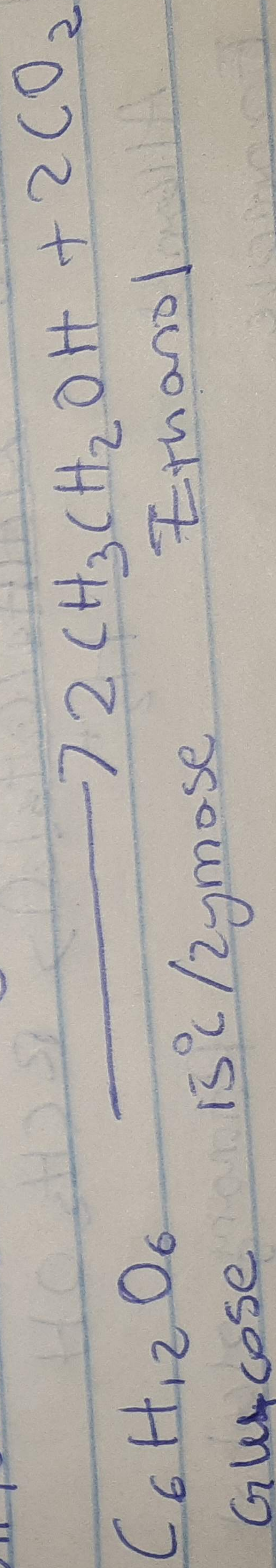
Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time and converted into maltose by the enzyme



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



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



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LEVEL: 100

Assignment

1. Discuss the two major classification of Alcohols.

Give two examples each for each class.

Classification of Alcohols

1. This is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a primary alcohol (1°). If it is one hydrogen atom, it is called secondary alcohol (2°) and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called alcohol (3°). Examples are: Methanol -  $\text{CH}_3\text{OH}$  and propan-2-ol -  $\text{CH}_3\text{CH(OH)CH}_3$

2. This is based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called glycols have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol. polyhydric alcohols are polyols have more than three hydroxyl groups. Examples are: Ethane-1,2-diol (Dihydric alcohol) -  $\text{HOCH}_2\text{CH}_2\text{OH}$  and propan-1,2,3-triol (Trihydric alcohol) -  $\text{OHCH}_2\text{CH(OH)CH}_2\text{OH}$