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19/MHS01/062

Medicine and surgery

MHS

① There are 2 major classification of alcohol:

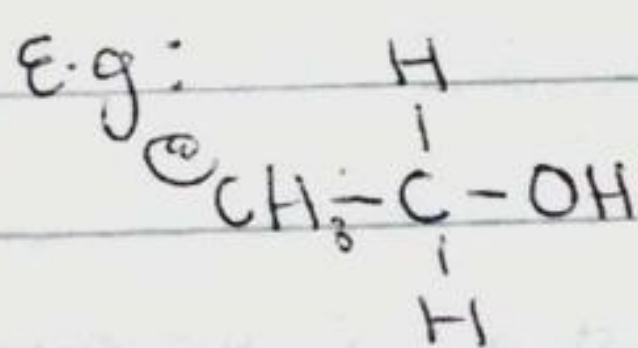
ⓐ Classification based on the number of alkyl group or hydrogen

Alcohol has the general formula, $R-OH$ where R is the alkyl group e.g. R can be methyl (CH_3), propyl (C_3H_7) or Octyl (C_8H_{17}) etc.

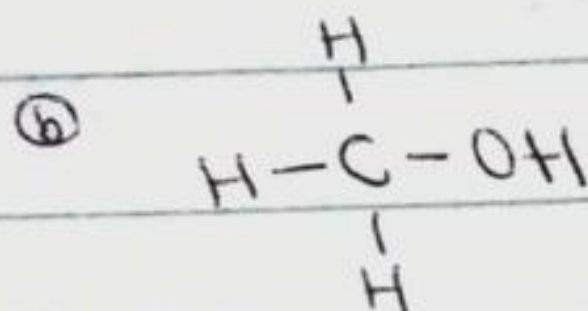
Based on number of alkyl groups, alcohol can be classified as:

- Primary alcohol (1°)
- Secondary alcohol (2°)
- Tertiary alcohol (3°)

Primary alcohols have only one alkyl group or 3 or 2 hydrogen atoms attached to the C-atom that carries the hydroxyl group.

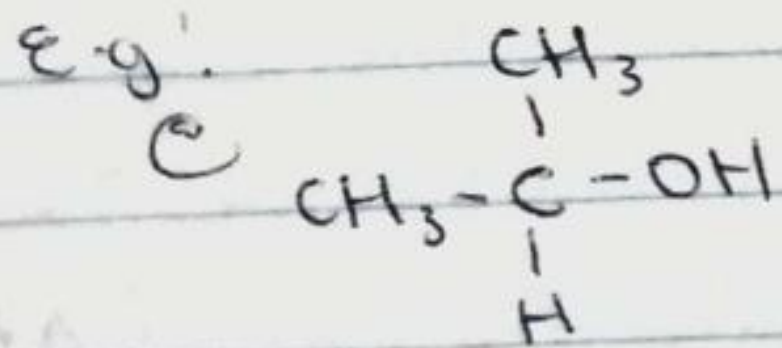


ethanol

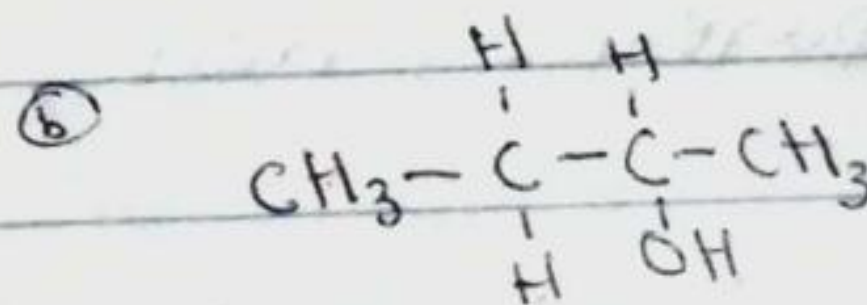


methanol

Secondary alcohols have 2 alkyl groups or one hydrogen attached to the carbon that carries the hydroxyl group.

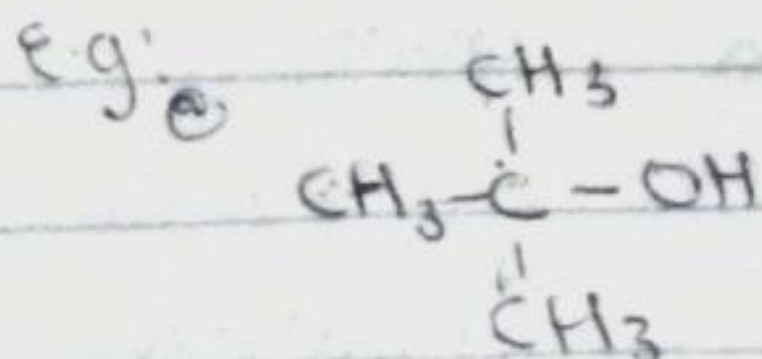


Propan-2-ol



butan-2-ol

Tertiary alcohols have 3 alkyl groups or no hydrogen atom attached to the carbon atom that carries the hydroxyl group.



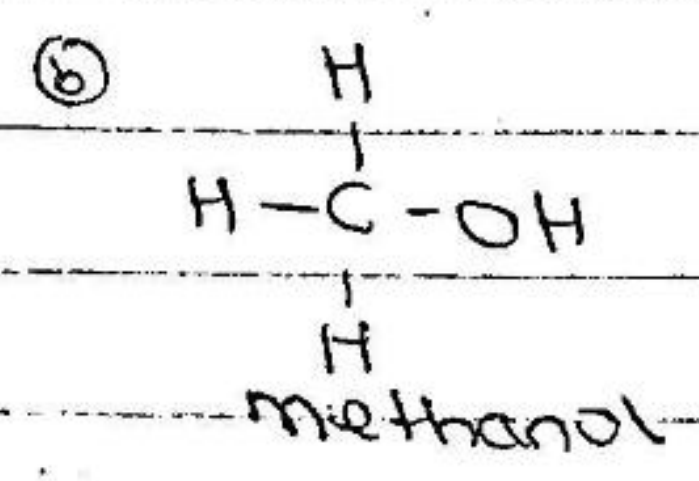
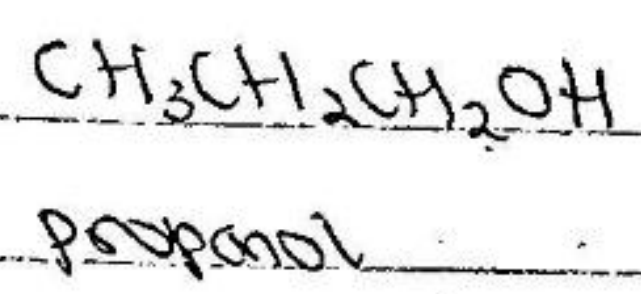
2-methylpropan-2-ol

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

- Monohydric
- Dihydric
- Trihydric
- Polyhydric

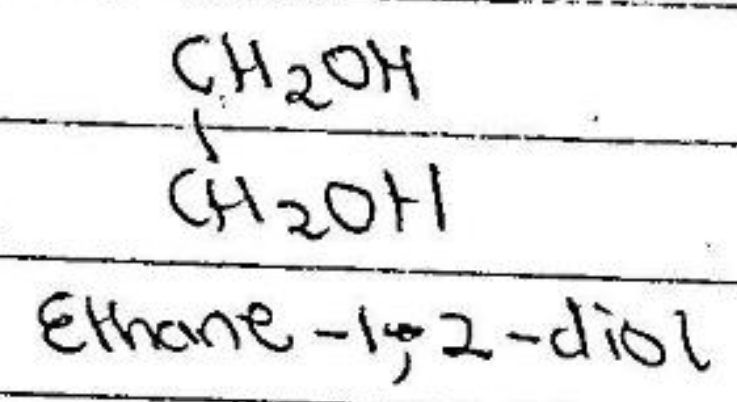
Monohydric alkanols have only one hydroxyl group (OH) present in the alkanol structure

E.g: e

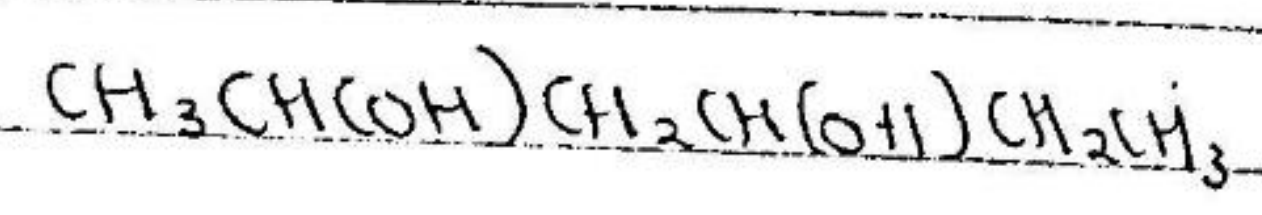


Dihydric alkanols have two hydroxyl group present in the alkanol structure. It's also called glycols.

E.g: e

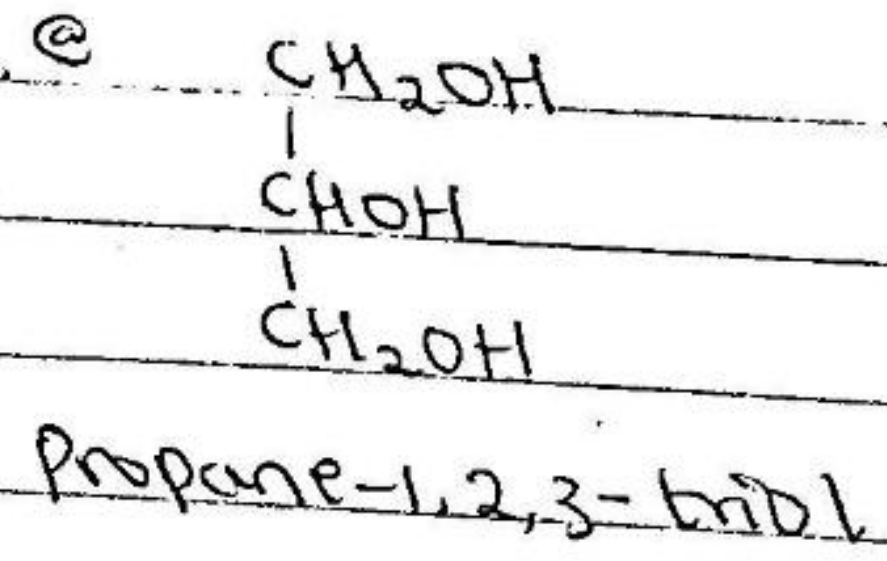


(b)

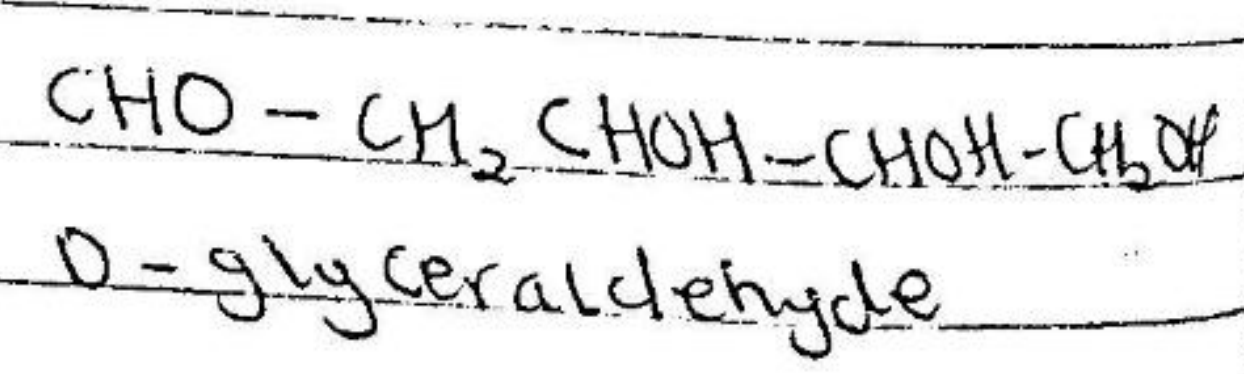


Trihydric alkanols have 3 hydroxyl group present in the alkanol structure. It's also called triols.

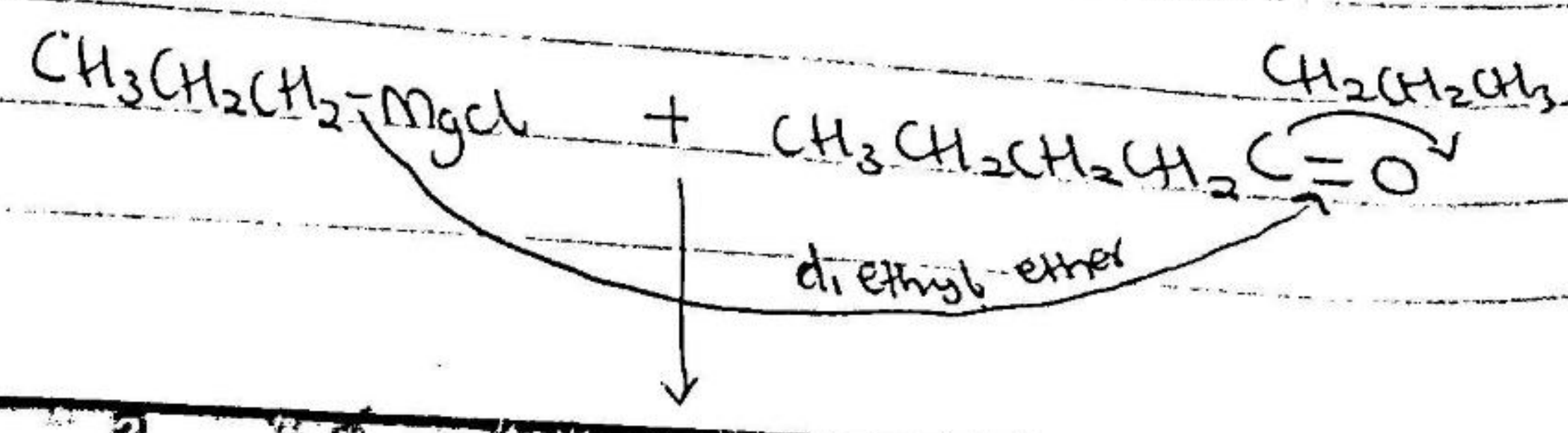
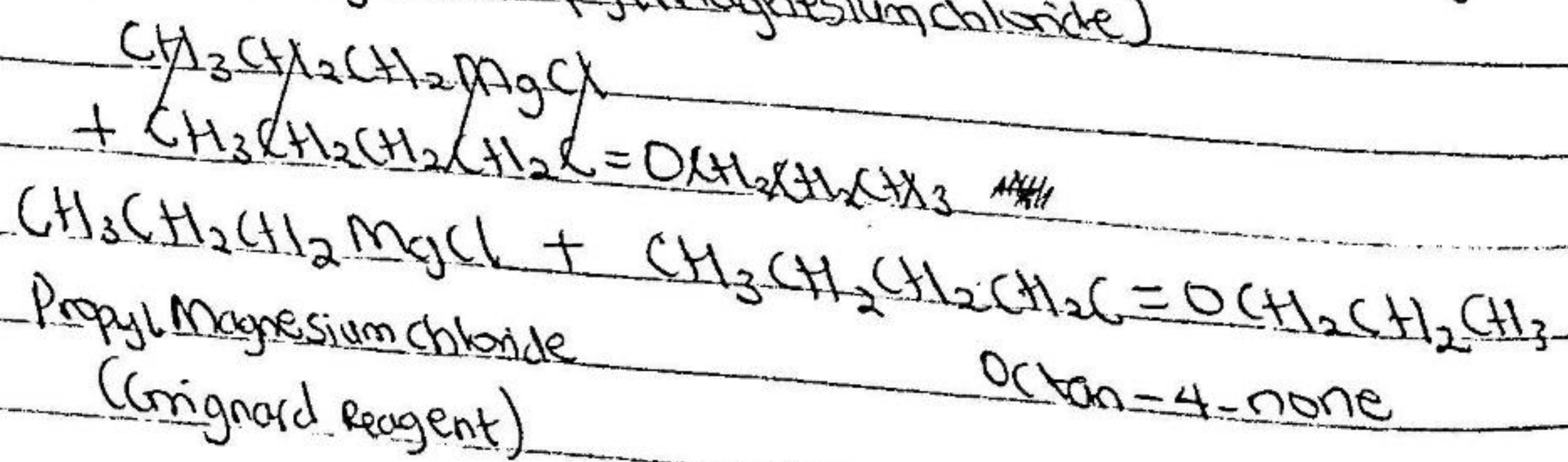
E.g: e

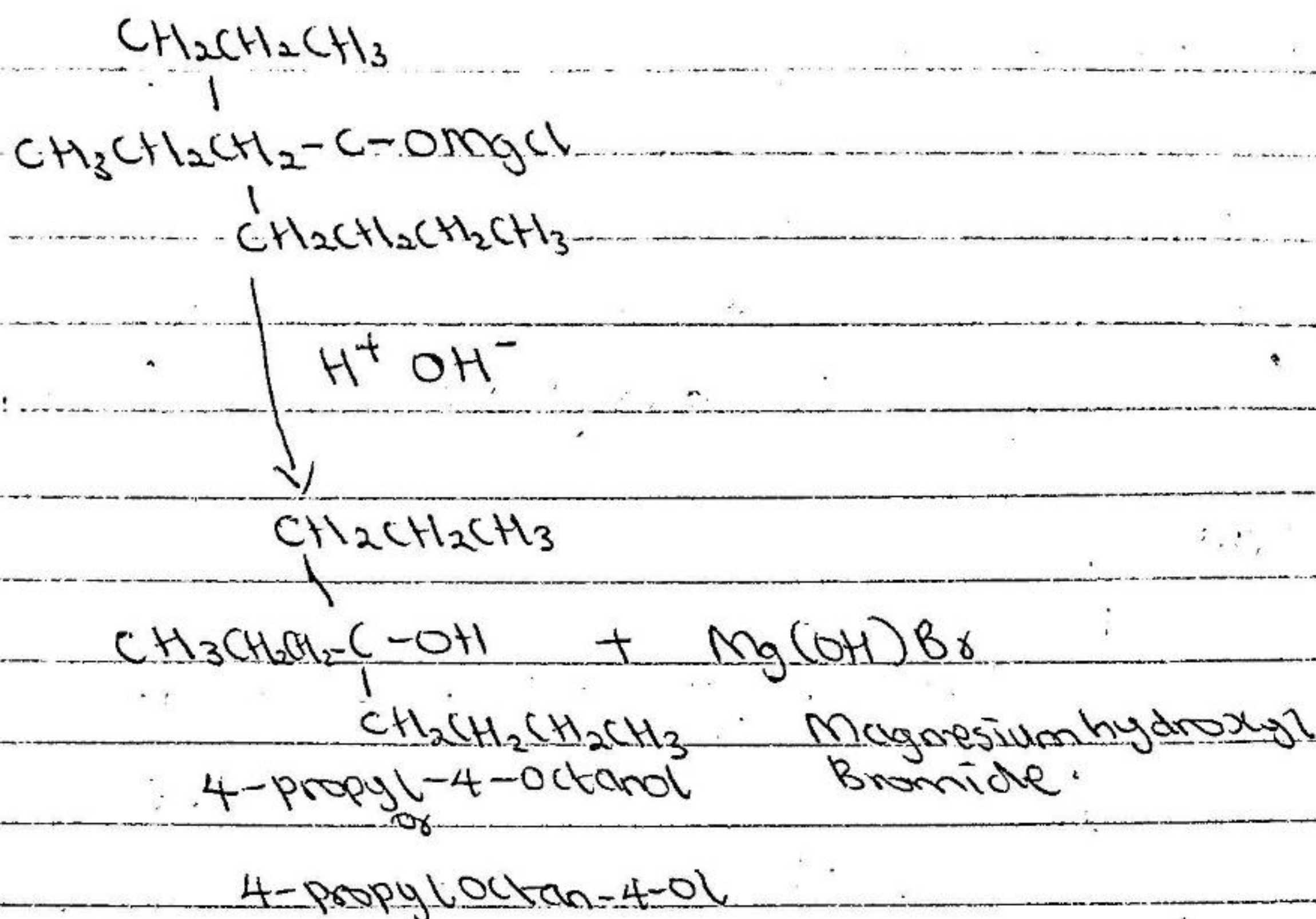


(b)



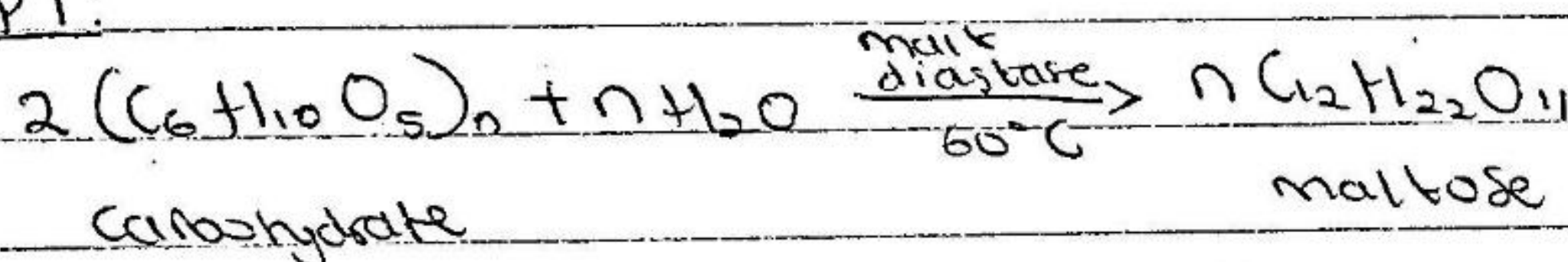
(2) The reaction of $CH_3CH_2CH_2CH_2C(=O)CH_2CH_2CH_3$ with Grignard reagent, $CH_3CH_2CH_2MgCl$ (propylmagnesium chloride)





③ Carbohydrate (starch) is the major natural produce used. Enzymes or biocatalyst breaks it down to produce alcohol. 95% ethanol can be gotten.

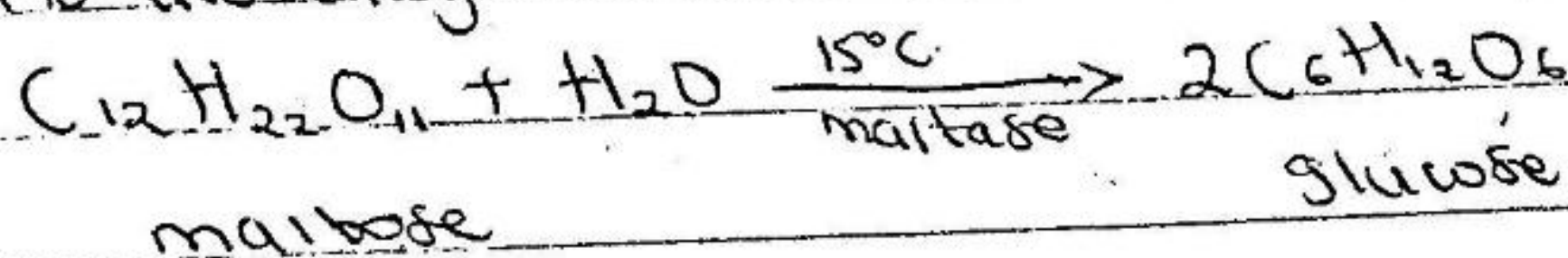
STEP 1:



The starch containing material is warmed with malt at 60°C for a period of time. It is converted to maltose by diastase, an enzyme contained in malt.

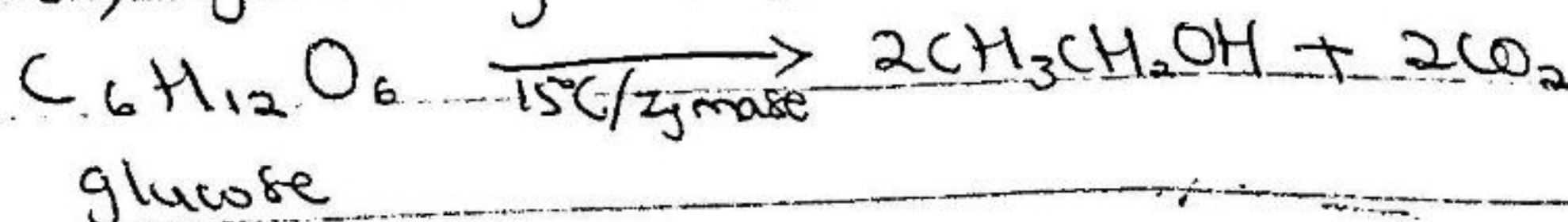
STEP 2:

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



STEP 3:

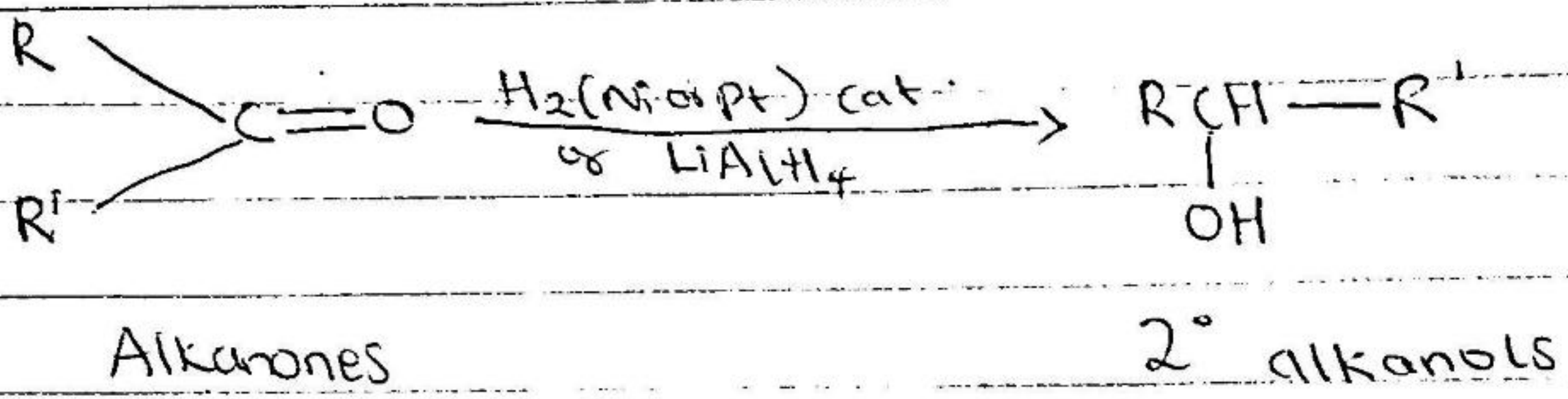
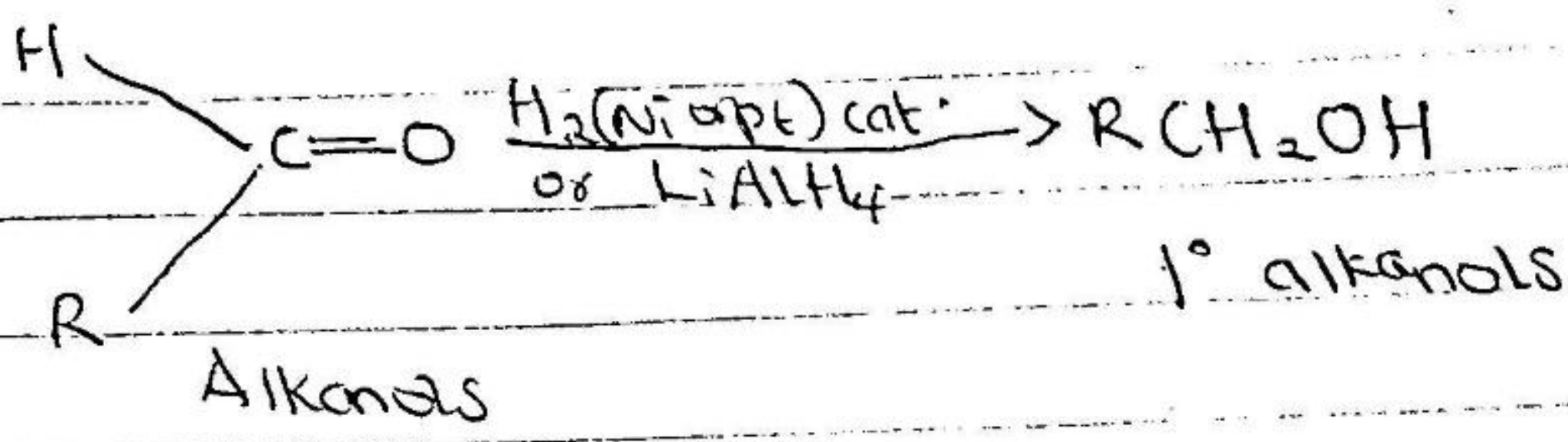
The glucose at constant temperature of 15°C is then converted into alcohol (ethanol) by the enzyme, zymase contained in yeast.



④ Alkanals are reduced to primary alkanols while alkanones are

reduced to secondary alkanols. This occurs by reaction with hydrogen in the presence of a platinum or nickel catalyst or with aluminium isopropoxide (the Meerwein-Ponndorf reaction) or with complex metal hydride, such as Lithium tri-tert-butoxyaluminum hydride (III) (LiAlH_4) or sodium tetrahydridoborate (III) (NaBH_4)

Alkanals:



Specific examples:

