

18/5/20

Chem 102 Assignment

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MEBS

## 1) Classification of Alcohols

Alcohol can be classified into 2:

- (a) Based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. In this classification there are 3 groups; if the number of hydrogen atoms attached to the carbon atom are 3 or 2 it's called a primary alcohol ( $1^\circ$ ), if the number of hydrogen atoms attached is one then it is a secondary alcohol ( $2^\circ$ ) and if no hydrogen atom is attached, it is called tertiary alcohol ( $3^\circ$ )  
Example:  $\text{CH}_3\text{CH}_2\text{OH}$  (Ethanol) - primary alcohol ( $1^\circ$ )

- (b) Based on the number of hydroxyl groups they possess. There are four groups here: Monohydric alcohols possess only one hydroxyl group in their structure, dihydric possess two hydroxyl groups in their structure while trihydric possess 3 hydroxyl groups in their structure and polyhydric or polyols have more than 3 hydroxyl groups.  
Example:  $\text{HOCH}_2\text{CH}_2\text{OH}$  (Ethane-1,2-diol) - dihydric alcohol

## 2 Solubility of Alcohols in water and organic solvents

### Water Solubility

Lower alcohols with 3 or more carbon atoms in their molecules are soluble in water because these lower molecular alcohols can form hydrogen bond with the water molecules. The solubility in water decreases with an increase in molecular mass though.

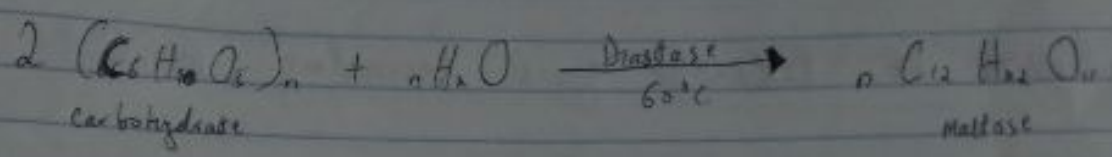
organic solvent

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

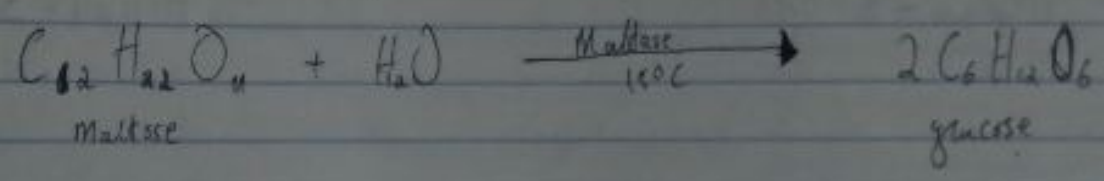
### (8) Industrial preparation of Ethanol

The starch containing materials like molasses, potatoes, cereals and rice can be used to produce ethanol through the process of ~~fermentation~~ fermentation. The biological catalyst in yeast (enzymes) can be used to break down carbohydrate molecules into ethanol to give a yield of 95%.

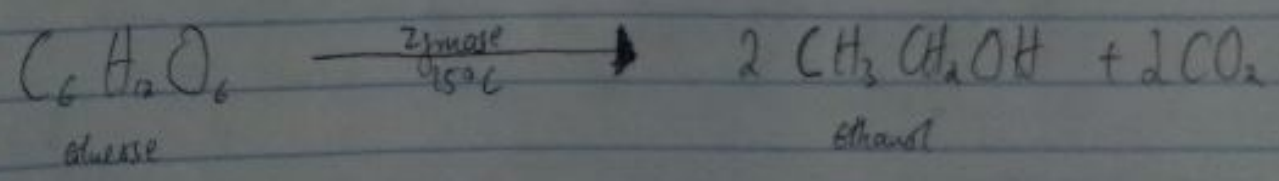
(i) The starch containing materials are warmed with malt at 60°C for a specific time and are converted to maltose by the enzyme diastase contained in malt.



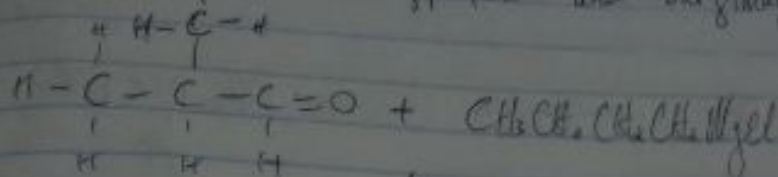
(ii) The Maltose is broken down into glucose on addition of yeast which contains the enzyme maltase at a temperature of 15°C.



(iii) Finally, the glucose at constant temperature of 15°C is then converted into alcohol by the enzyme, zymase, found in yeast.

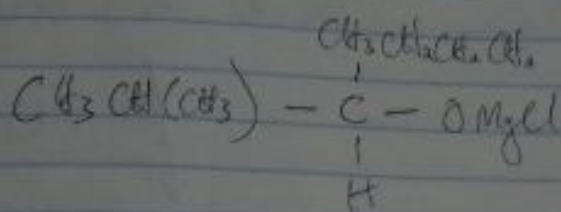


Reaction of 2-methylpropanal and butylmagnesium chloride

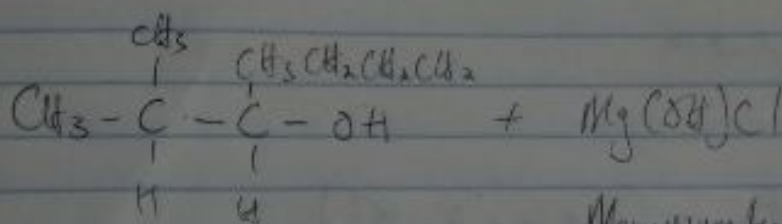


2-methyl propanal

Butyl magnesium chloride (Grignard reagent)



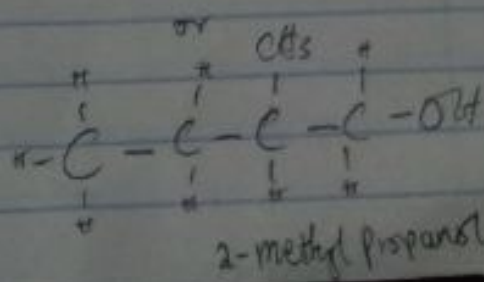
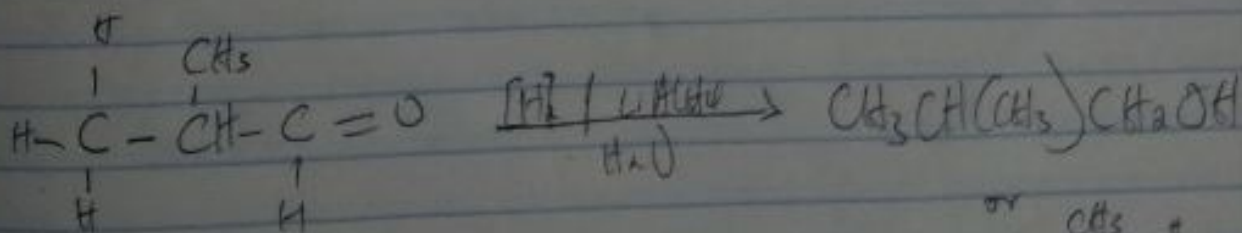
Hydrolysis  $\downarrow$   $\text{H}^+$   $\text{OH}^-$



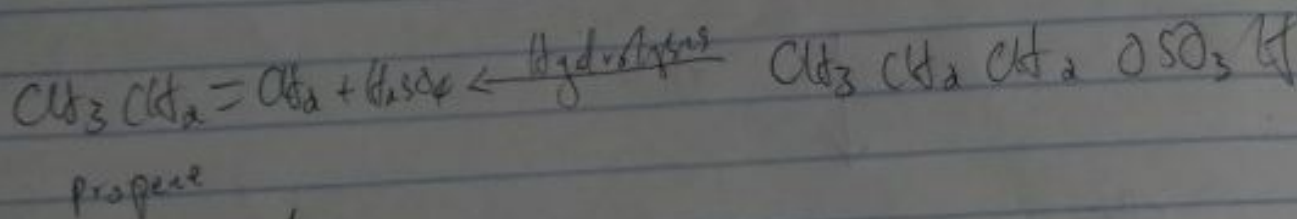
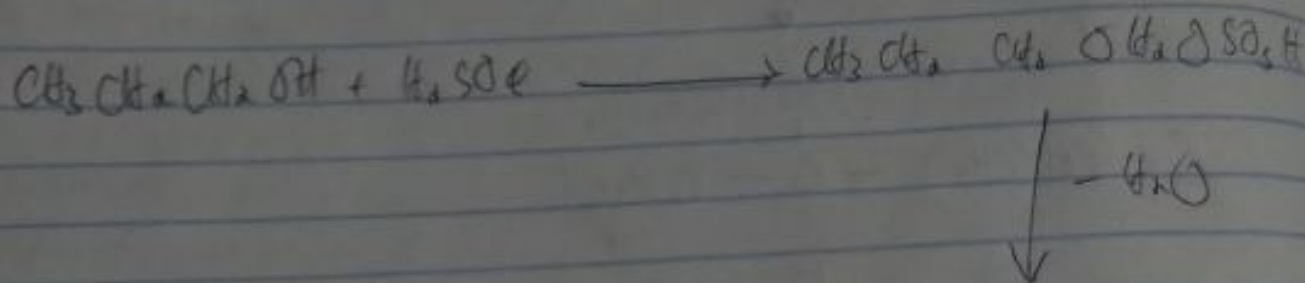
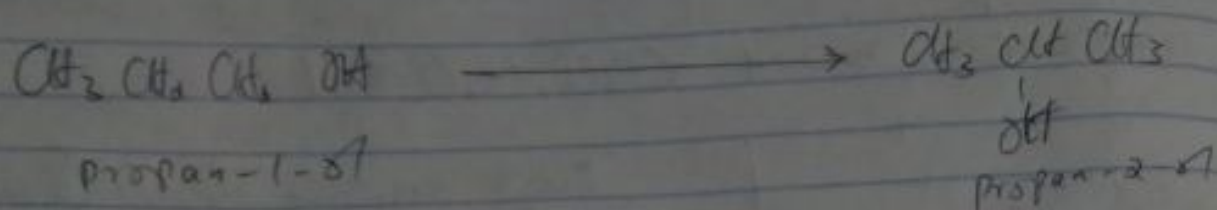
Magnesium hydroxy chloride

2-methyl heptanal

(7) Reduction of 2-methyl propanal



8 Propan-1-ol to Propan-2-ol -



Propene

