

## EXPERIMENT TWO

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Course: Chem 102

### I. Classification of Alkanols

(a) This is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a primary alkanol ( $1^\circ$ ), if it is one hydrogen atom, it is called secondary alkanol and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a tertiary alkanol ( $3^\circ$ ).

Examples are  $\text{CH}_3\text{OH}$  - methanol ( $1^\circ$ )

$\text{CH}_3\text{CH}_2\text{OH}$  - Ethanol ( $1^\circ$ )

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

$(\text{CH}_3)_3\text{COH}$  - 2-methylpropan-2-ol ( $3^\circ$ )

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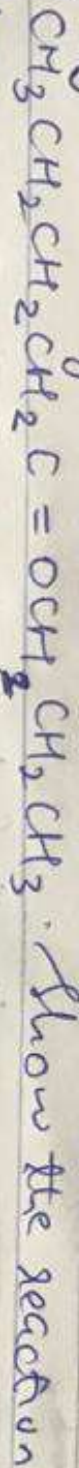
(b) This is based on the number of hydroxyl groups they possess. Monohydric alcohols ~~are also called~~ have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called glycols have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol.

Examples are:  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  - Propanol { Monohydric alcohol }

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

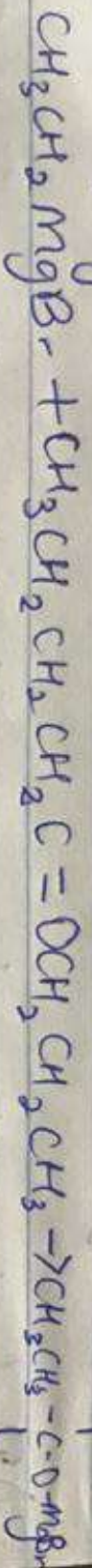


2. In the Grignard synthesis of Alkanols, react a named Grignard reagent with

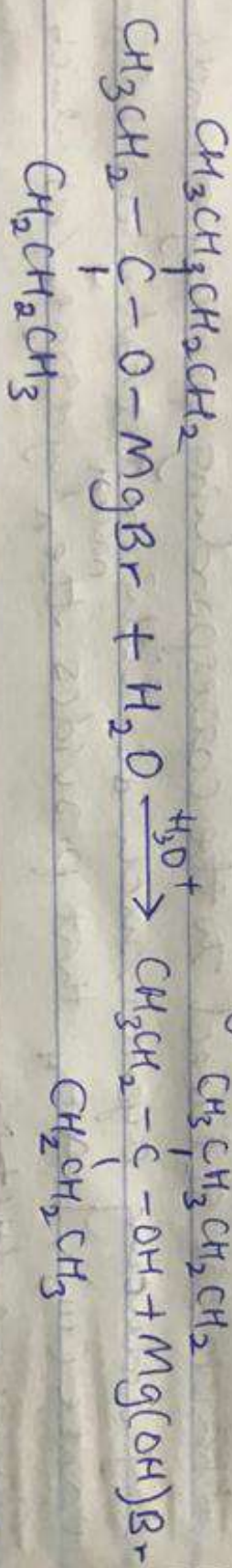


Steps

First Stage



Dilute acid is then added to this to hydrolyze it



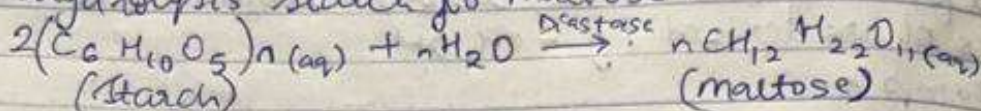
An Alcohol is formed. The key use of Grignard reagent is the ability to make complicated alcohols easily.



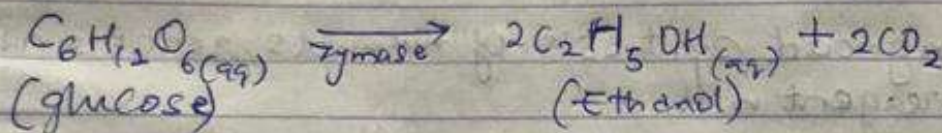
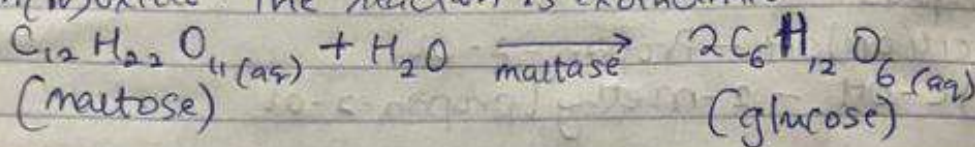
### 3) Industrial preparation of ethanol

a) The starch containing crop, such as Cassava is peeled crushed and steam heated or pressure-cooked to release with water to obtain a mash.

b) The mash is treated with malt yeast, and warmed at  $50^{\circ}\text{C}$  for two hours. Enzyme diastase in the malt hydrolyses starch to maltose.



c) Yeast containing enzymes maltase and zymase is added to mixture and kept at room temperature (about  $25^{\circ}\text{C}$ ) for about three days. During this period, enzyme zymase ferments glucose to ethanol with the evolution of carbon(IV)oxide. The reaction is exothermic.



The mixture is distilled to obtain 95% ethanol that boils at  $78^{\circ}\text{C}$ .

### 4) Products obtained in the reduction of Alkanone and Alkanal.

Alkanals are reduced to the corresponding primary alkanols by reducing agents such as lithium tetrahydridoaluminate (III),  $\text{LiAlH}_4$  that provides the nascent hydrogen (H) which causes reduction.

a) Ethanal is reduced to ethanol

