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DEPARTMENT; Medicine and Surgery

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COURSE; General Chemistry 2

Assignment

1. Alkanols also known as alcohols are organic compounds consisting of carbon, hydrogen and oxygen. Its functional group is the $-OH$ group. It is classified based on two factors;

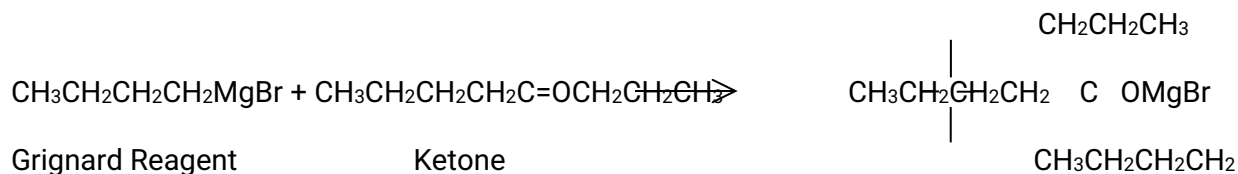
- i. Based on the number of $-OH$ groups present; there are four classes based on this classification, monohydric, dihydric, trihydric and polyhydric alcohols. Monohydric alcohols contain only one hydroxyl group in their structures. Dihydric alkanols contain two hydroxyl groups in their structures. Trihydric alcohols contain three $-OH$ groups in their structures. And, polyhydric alcohols contain more than three $-OH$ groups in their structure.
- ii. Based on the number of Hydrogen atoms attached to the $-OH$ bearing carbon atom; according to this classification there are three classes, primary, secondary and tertiary alkanols. Primary alkanols have two or three hydroxyl groups attached to the carbon atom bearing the $-OH$ group. Secondary alkanols have only one Hydrogen atom attached to the carbon atom bearing the $-OH$ groups. Tertiary alkanols have no hydrogen atom attached to the $-OH$ bearing carbon atom.

s/n	Classes	Examples
1.	Monohydric alkanols	Methanol (CH_3OH), Ethanol (C_2H_5OH)
2.	Dihydric alkanols	Propan-1,2-diol ($OHC_2CH(OH)CH_3$), Butan-1,2-diol ($OHC_2CH(OH)CH_2CH_3$)
3.	Trihydric alkanols	Butan-1,2,3-triol, pentan-1,2,3-triol
4.	Polyhydric alkanols	Heptan-1,2,3,4,5-pentaol, Octan-1,2,3,4-butol
5.	Primary alkanols	Butan-1-ol, propan-1-ol
6.	Secondary alkanols	Butan-2-ol, propan-2-ol
7.	Tertiary alkanols	Methylpropan-2-ol, 2-methyl-2-butanol

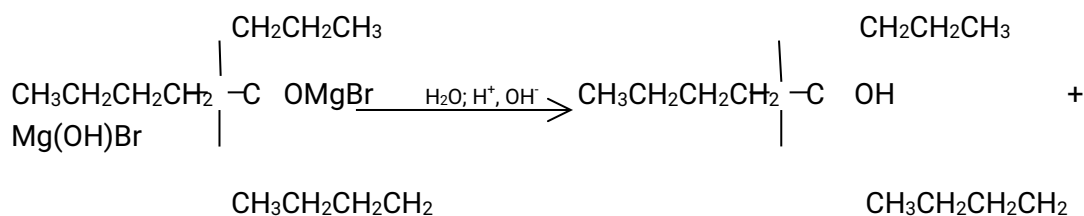
1. Grignard Reagent; $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{MgBr}$

Ketone; $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$

Step 1; Grignard Reagents react with Ketone to produce an intermediate



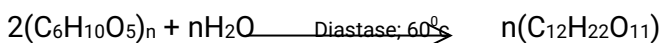
Step 2; Dilute acid is added to the intermediate to form an alcohol



3. Industrial Preparation Of Ethanols

Ethanol is produced via the natural process of fermentation of carbohydrates such as starch. The entire process of fermentation is shown in the following steps:

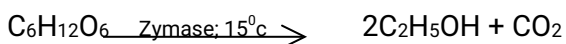
Step 1;



Step 2;

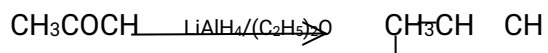


Step 3;



2. Alkanones are reduced to secondary alcohols by reaction with hydrogen in the presence of a platinum or nickel catalyst or with a complex metal hydride like Lithium tetrahydridoaluminate (III) (LiAlH_4) in ethoxyethane (C_2H_5)₂O

Example;



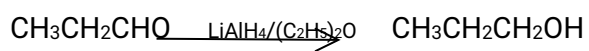
Ketone

OH

Secondary alcohol

Alkanals are reduced to primary alcohols by the reaction with hydrogen in the presence of a platinum or nickel catalyst or with aluminum isopropoxide or with complex metal hydride like sodium tetrahydridoborate (III), (NaBH_4) in water or methanol or $\text{LiAlH}_4 / (\text{C}_2\text{H}_5)_2\text{O}$

Example;



Aldehyde

Primary Alcohol