

B.Sc. GE-II (Chemistry) I Year

Chemistry- Chemical Energetics, Equilibria and Functional Organic Chemistry

Unit 6

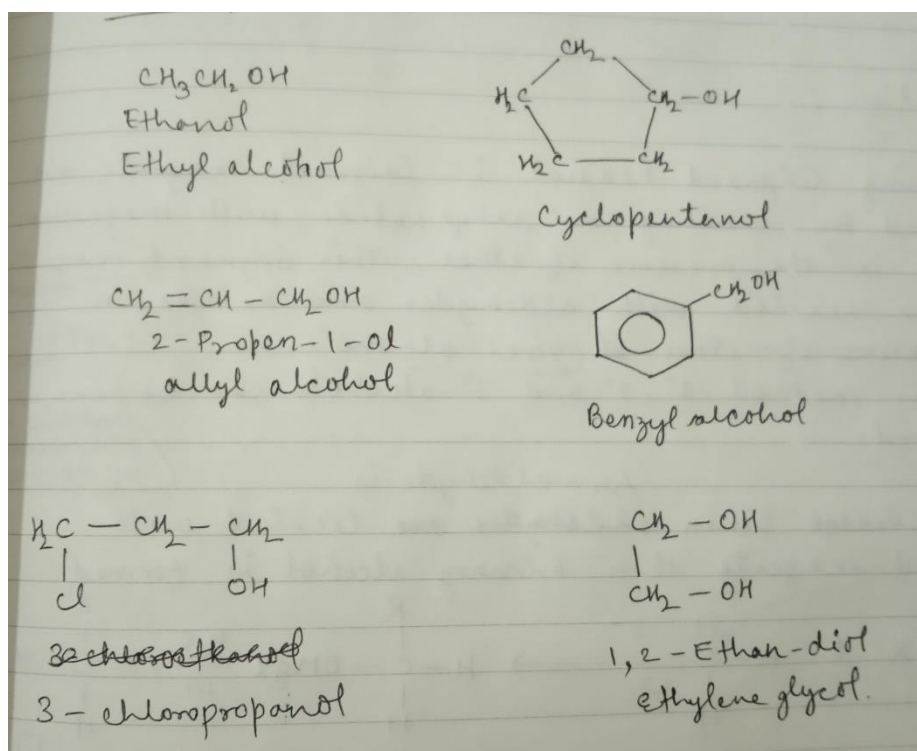
Alcohols, Phenols, Ether, aldehydes and Ketones

Alcohols

Structure

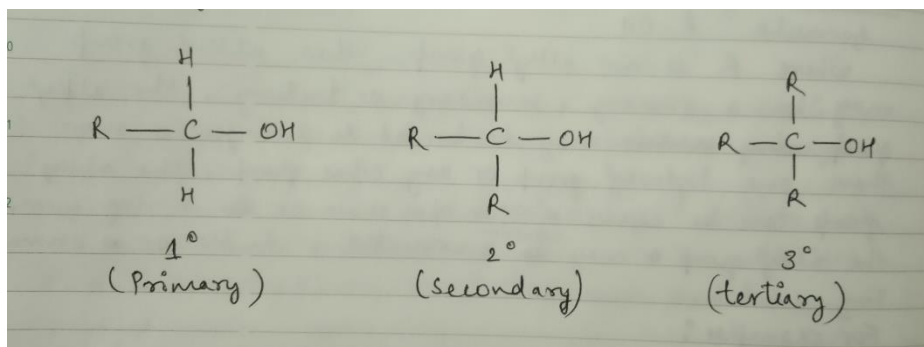
Alcohols are the organic compounds in which a hydroxyl group is present on a sp^3 carbon atom. Based on the number of C - OH groups present on the molecule it can be monohydric, dihydric, trihydric or polyhydric alcohols.

Examples:



Classification of Alcohols

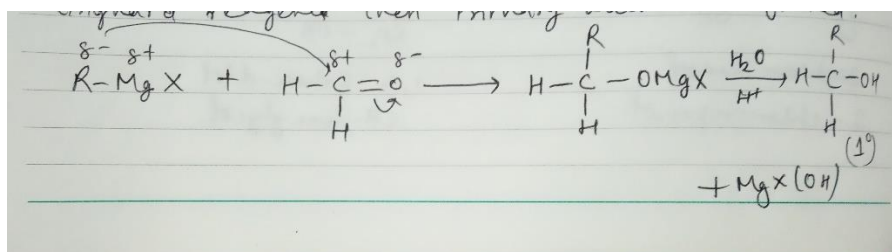
Alcohols can be classified as Primary, secondary or tertiary alcohols based on the carbon atom to which the -OH group is attached.



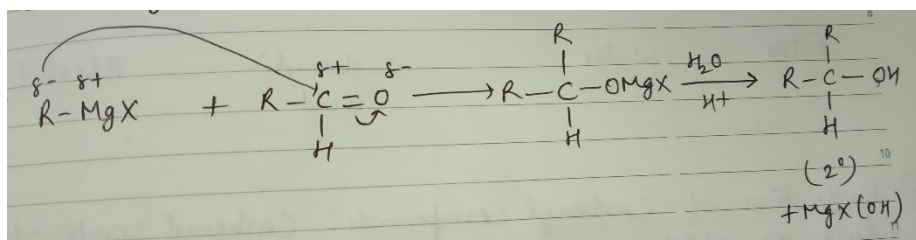
Preparation

1) By Grignard reagents: Grignard reagents are prepared by treating an alkyl halide with magnesium ribbons in the presence of ether. This Grignard reagent when added to aldehydes and ketones it gives nucleophilic addition product which on hydrolysis in the presence of dilute acid gives alcohol.

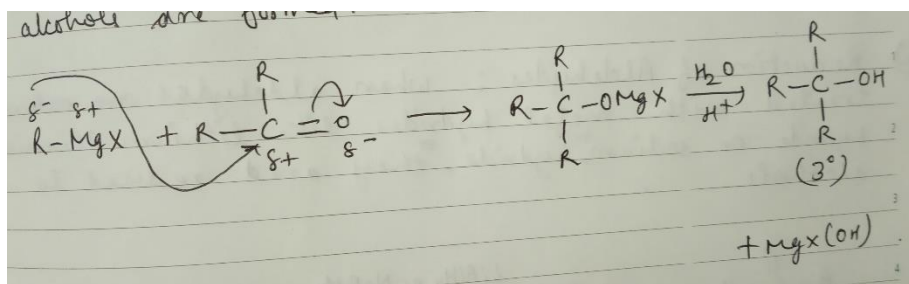
(a) When formaldehyde is treated with Grignard reagent primary alcohols are formed.



(b) When other aldehydes except formaldehyde are treated with Grignard reagent secondary alcohols are formed.

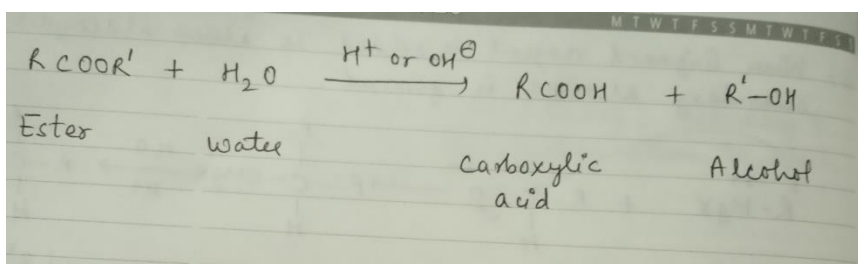


(c) When ketones are treated with Grignard reagent tertiary alcohols are formed.

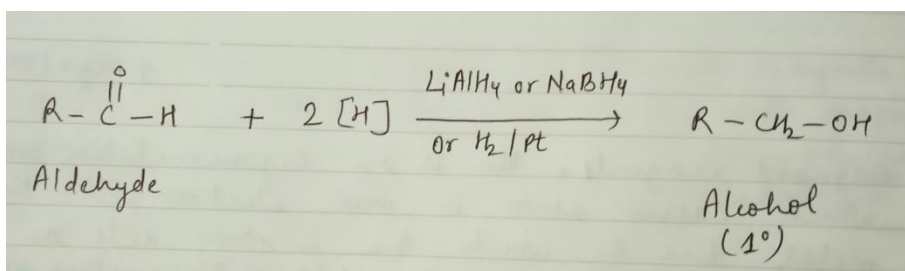


The Grignard reagents are organometallic compounds in which carbon atom is more electronegative than the metal due to which the C-atom acts as carbanion and can attack electrophilic centres of aldehydes and ketones.

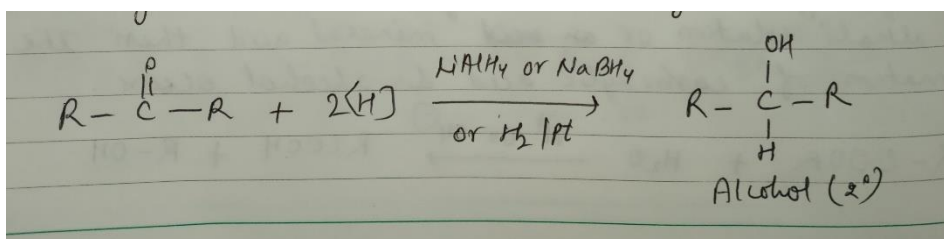
- 2) Ester hydrolysis: When organic esters are treated with dilute NaOH/KOH or dilute mineral acids then formation of alcohol and carboxylic acid takes place.



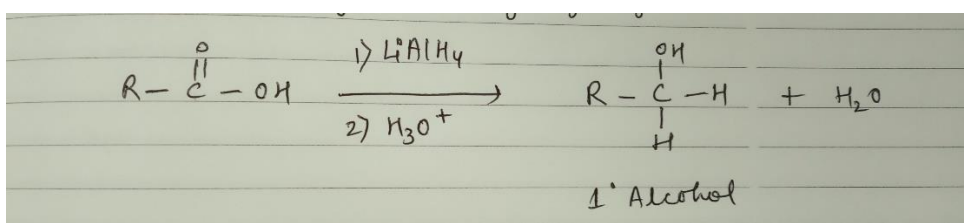
- 3) Reduction of Aldehydes: When aldehydes are treated with metal hydrides like lithium aluminium hydride or sodium borohydride or with hydrogen in the presence of metal catalyst like Pt, Pd or Ni they are reduced to primary alcohols.



- 4) Reduction of ketones: When ketones are treated with metal hydrides like lithium aluminium hydride or sodium borohydride or with hydrogen in the presence of metal catalyst like Pt, Pd or Ni they are reduced to secondary alcohols.



- 5) Reduction of Carboxylic acids: Carboxylic acids can be converted to alcohols by treating it with lithium aluminium hydride followed by hydrolysis in the presence of dilute hydrochloric acid.



- 6) Reduction of Carboxylic esters: Carboxylic esters can be converted to alcohols by treating it with lithium aluminium hydride followed by hydrolysis in the presence of dilute hydrochloric acid.

