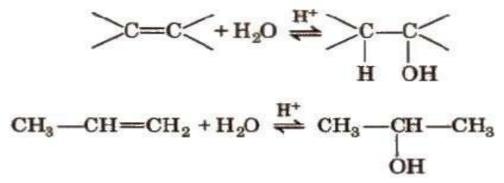
# CHEMISTRY STUDY MATERIALS FOR CLASS 12 (NCERT Based Notes of Chapter - 11) GANESH KUMAR DATE: 01/10/2020

## **Alcohols, Phenols and Ethers**

### **Preparation of Alcohols**

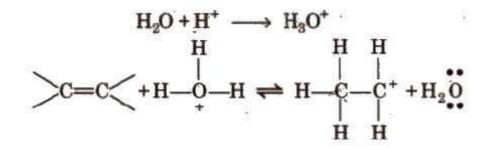
(i) From alkenes

(a) By acid catalyzed hydration in accordance with Markovnikov's rule.

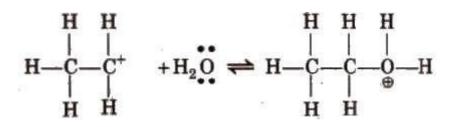


#### Mechanism

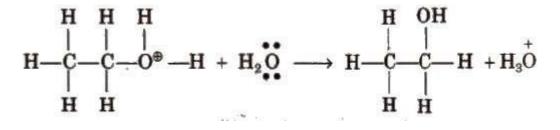
**Step** I Protonation of alkene by attack of H<sub>3</sub>O<sup>+</sup>



**Step II Nucleophilic attack** 



Step III Deprotonation to form an alcohol



(b) By hydroboration-oxidation

$$CH_{3}-CH=CH_{2}+(H-BH_{2})_{2} \longrightarrow CH_{3}-CH-CH_{2}$$

$$H BH_{2}$$

$$CH_{3}-CH=CH_{2}$$

$$(CH_{3}-CH_{2}-CH_{2})_{3}B \xleftarrow{CH_{3}-CH=CH_{2}} (CH_{3}-CH_{2}CH_{2})_{2}BH$$

$$3H_{2}O_{2},OH \downarrow H_{2}O$$

$$3CH_{3}CH_{3}CH_{3}CH_{3}OH + B(OH)_{3}$$

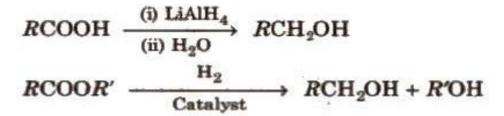
#### (ii) From carbonyl compounds

(a) By reduction of aldehydes and ketones

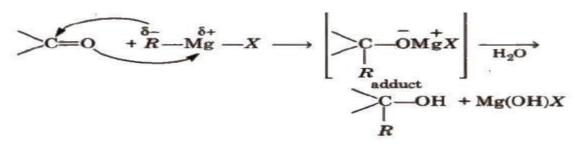
 $\begin{array}{ccc} R & \longrightarrow & R \\ R & \longrightarrow & R \\ R \\ COR' & \xrightarrow{\text{NaBH}_4} & R \\ & & & \downarrow \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & & \\ & & & \\ & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\$ 

Aldehydes yield primary alcohols whereas ketones give secondary alcohols, when subjected to reduction.

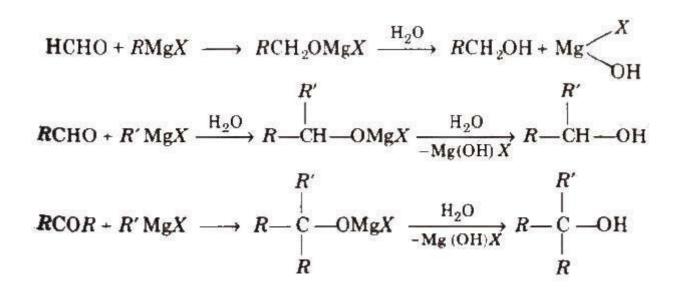
(b) By reduction of carboxylic acids and ester



Reduction of aldehyde, ketones and esters with No Alcohol is called Bouveault-blanc reduction.



The reaction produces a primary alcohol with methanol, a secondary alcohol with aldehydes (except methanal) and tertiary alcohol with ketones



(iv) Hydrolysis of alkyl halides

 $R - X + KOH(aq) \rightarrow ROH + KX$ 

To avoid dehydrohalogenation of RX, mild alkalies like moist Ease of hydrolysis of alkyl halides RI > R - Br > RCI > and t > s > p alkyl halides.

(v) Hydrolysis of ethers

 $R \longrightarrow O R + H_2O \longrightarrow 2ROH$ 

(vi) From primary amines By treatment with nitrous acid.

 $RNH_2 + HONO \xrightarrow{(NaNO_2 + HCI)} ROH + N_2 + H_2O$ 

Methylamine does not give methyl alcohol when treated with  $HNO_2$ . It gives  $CH_3OCH_3$  and  $CH_3ONO$ .

#### (vii) By alcoholic fermentation

 $\begin{array}{cccc} C_{12}H_{22}O_{11} + H_2O & \xrightarrow{\text{Invertase}} & C_6H_{12}O_6 + C_6H_{12}O_6 \\ \text{sucrose} & & \text{glucose} & \text{fructose} \\ \hline C_6H_{12}O_6 & \xrightarrow{\text{Zymase}} & 2C_2H_5OH + 2CO_2(g) \\ \text{glucose and fructose} & & \text{ethyl alcohol} \end{array}$ 

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