CHAPTER-3

Alcohols

DATE

Introduction:-

The hydroxy derivatives of aliphatic hydrocarbon obtained by the replacement of 1 or more hydrogen atoms of the aliphatic hydrocarbons by the same number of -OH (hydroxy group) from the different carbon atoms called alcohol.

General representation:- $C_nH_{2n+1}OH$

$$R-H \xrightarrow[+(-OH)]{-H} R-OH \qquad H-O-H + R \xrightarrow{-H} ROH.$$

alkane — alcohol

Example:-

CH_3CH_2OH
Ethanol
Ethyl alcohol.

CH_2-CH_2
| |
OH OH
ethylene glycol

$CH_2-CH-CH_2$
| | |
OH OH OH
Glycerol
Glycerine

classification of alcohol:-

Alcohols are ~~classified~~ classified into monohydric, dihydric, trihydric and polyhydric on the basis of number of -OH group present in molecule.

1. Monohydric alcohol →

Containing only one -OH group in the molecule

eg:- CH_3CH_2OH, CH_3OH, $CH_3CH_2CH_2OH$.

2. Dihydric alcohol →

containing two OH- group in the molecule.

eg:- CH_2-CH_2
| |
OH OH

Ethylene glycol
Ethane-1,2-diol

3. Trihydric alcohol →
containing 3 - OH group in a molecule.

eg:- $CH_2(OH)-CH(OH)-CH_2(OH)$

Glycerol / Glycerine

4. Polyhydric alcohol →
containing many - OH groups in a molecule.

$CH_2(OH)-(CH(OH))_4-CH_2(OH)$

eg:- Mannetol / Sorbiter

Classification of Monohydric alcohol

General formula

$R-CH_2-OH$ 1^0 alcohol

$R-CH(R)-OH$ 2^0 alcohol

$R-C(R)(R)-OH$ 3^0 alcohol

Example.

$CH_3CH_2CH_2-OH$
n-propyl alcohol

$CH_3-CH(OH)-CH_2-CH_3$
Sec-Butyl alcohol

$CH_3-C(OH)(CH_3)-CH_3$
Tert-Butyl alcohol.

Nomenclature:-

Prefix + suf wood root + Suffix.

Alkane + ol

General formula	common name	IUPAC
CH_3OH	Methyl alcohol	Methanol
CH_3CH_2OH	Ethyl alcohol	Ethanol
$CH_3CH_2CH_2OH$	n-propyl alcohol	1-propanol
$CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$	ISO-propyl alcohol	Propan-2-ol
$CH_3-\overset{\overset{OH}{|}}{CH}-CH_2CH_3$	Sec-butyl alcohol	Butan-2-ol.
$CH_3-\overset{\overset{CH_3}{|}}{CH}-CH_2OH$	ISO-butyl alcohol	2-methyl propan-1-ol.
$CH_3-\overset{\overset{OH}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_3$	T. tert-butyl alcohol	2-methyl propan-2-ol
$\underset{\underset{OH}{|}}{CH_2}-\underset{\underset{OH}{|}}{CH_2}$	Ethylene glycol	Ethane-1,2-diol
$\underset{\underset{OH}{|}}{CH_2}-\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH_2}$	glycerol	Propane-1,2,3-triol

Isomerism in alcohol:-

Alcohol shows chain, positional and functional isomerism

→ Alcohol shows functional isomerism with ether.

1. Chain isomerism → Alcohols containing more than three carbon atoms exhibit chain isomerism.

Molecular formula: $C_4H_{10}O$ (possible isomer)

$H_3C-CH_2-CH_2-CH_2OH$ — Butanol

$CH_3-\underset{CH_3}{\underset{|}{CH}}-CH_2OH$ — 2-Methyl propanol

Chain isomer

→ It differs in the length of carbon chain.

2. Position isomerism → Alcohols containing more than two carbon atoms exhibit position isomers

Molecular formula: C_3H_8O

$CH_3CH_2CH_2OH$ — propanol

$CH_3-\underset{OH}{\underset{|}{CH}}-CH_3$ — propan-2-ol

→ Differ in position of -OH group in the chain.

3. Functional isomerism → It differs in the functional group of two compounds. Alcohol shows functional isomerism with ether.

i) C_2H_6O

CH_3CH_2OH — Ethanol

CH_3-O-CH_3 — methoxymethane (dimethyl ether)

2) C_3H_8O

$CH_3CH_2CH_2OH$ — 1-propanol

$CH_3CH_2-O-CH_3$ — Methoxy ethane.

Q.N Write the possible isomer of C_3H_8O with their IUPAC name.

$C_nH_{2n+1}OH$ $\quad C_3H_7OH \leftrightarrow C_3H_8O$

$CH_3CH_2CH_2-OH$

IUPAC: propan-1-ol

$CH_3-CH(CH_3)-OH$

propan-2-ol

$CH_3-O-CH_2CH_3$

IUPAC:- methoxy ethane

VI # Distinction of 1°, 2° and 3° alcohol by Victor Meyer's method.

→ Victor meyer's method is one of the most convinient method for the distinction of 1°, 2° and 3° alcohol. In this method, the alcohol to be tested is first converted in to corresponding alkyl iodide by reacting with red phosphorous and iodine or HI then it is reacted with silver nitrite ($AgNO_2$). Now the solution is allowed to react with nitrous acid (HNO_2) obtained by the action of $NaNO_2$ and HCl. Finally the solution is made alkaline by adding excess KOH solution.

In doing so, if blood red coloration is observed it indicated primary alcohol, if blue coloration is observed it indicates 2° alcohol. If colourless solution is observed it indicates 3° alcohol.

The reaction involve during the process is tabulated below:-

1. Primary alcohol → (Blood red colour)

$$R-CH_2OH \xrightarrow[\text{or } HI]{\text{Red } P + I_2} R-CH_2-I \xrightarrow{AgNO_2} R-CH_2-NO_2$$

$$R-CH_2-NO_2 \xrightarrow[HNO_2]{(NaNO_2+HCl)} R-\underset{\underset{N-OH}{\|}}{C}-NO_2 \xrightarrow[\text{Excess}]{KOH} \text{Blood red colour}$$

(2) Secondary alcohol → (2^0 alcohol) :- Blue colouration.

$$R-\underset{\underset{H}{|}}{\overset{\overset{R}{|}}{C}}-OH \xrightarrow[HI]{\text{Red } P + I_2} R-\underset{\underset{H}{|}}{\overset{\overset{R}{|}}{C}}-I \xrightarrow{AgNO_2} R-\underset{\underset{H}{|}}{\overset{\overset{R}{|}}{C}}-NO_2$$

$$R-\underset{\underset{H}{|}}{\overset{\overset{R}{|}}{C}}-NO_2 \xrightarrow[-H_2O]{(NaNO_2+HCl)\ HNO_2} R-\underset{\underset{N=O}{|}}{\overset{\overset{R}{|}}{C}}-NO_2 \xrightarrow[KOH]{\text{excess}} \text{Blue colour}$$

Pseudonitrole.

(3) Tertiary alcohol (3^0 alcohol) :- Colourless.

$$R-\underset{\underset{R}{|}}{\overset{\overset{R}{|}}{C}}-OH \xrightarrow[\text{or } HI]{\text{Red } P + I_2} R-\underset{\underset{R}{|}}{\overset{\overset{R}{|}}{C}}-I \xrightarrow{AgNO_2} R-\underset{\underset{R}{|}}{\overset{\overset{R}{|}}{C}}-NO_2$$

$$R-\underset{\underset{R}{|}}{\overset{\overset{R}{|}}{C}}-NO_2 \xrightarrow{HNO_2} \text{No rxn} \xrightarrow[\text{excess}]{KOH} \text{Colourless}$$

Note:-

Lucas test

Lucas reagent (conc. HCl + anhydrous $ZnCl_2$)
1 : 1 mole

- 1^0 alcohol (No turbidity)
- 2^0 alcohol turbidity after (5 min)
- 3^0 alcohol with in a second (Immediate)

General Method of preparation of alcohol :-

(1) From alkyl halide (R-X) i.e haloalkane →

G.R

$$R-X + aq.\ KOH \longrightarrow R-OH + KX$$

Eg :- $CH_3-CH_2-Cl + aq.\ KOH \longrightarrow CH_3-CH_2-OH + KCl$

or moist Ag_2O or AgOH

Ethanol.

Imp

(2) From Grignard Reagent (from carbonyl compounds)
↳ aldehyde or ketone

Aldehyde or ketone react with grignard reagent to form an addition compound which on hydrolysis gives different types of alcohols.

G.R

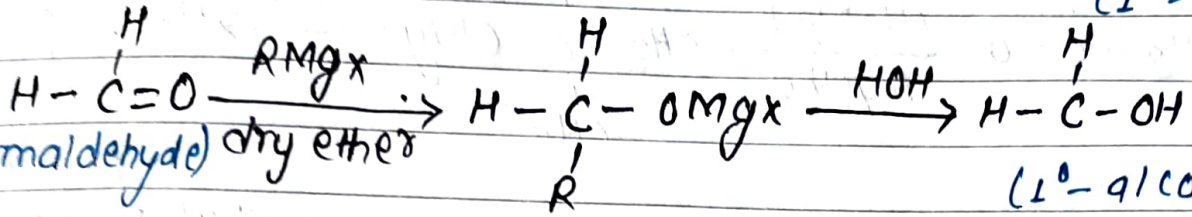
$$>C=O \xrightarrow[\text{dry ether}]{RMgX} -\overset{|}{\underset{|}{C}}-OMgX \xrightarrow[\text{(hydrolysis)}]{HOH} -\overset{|}{\underset{|}{C}}-OH + Mg(OH)X$$

R, R

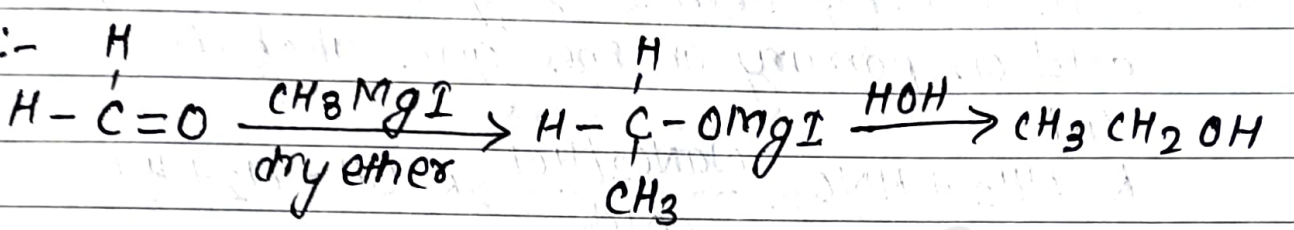
Alcohol

Imp.

(I) Formaldehyde with grignard reagent gives primary alcohol:- (1^0-alcohol)

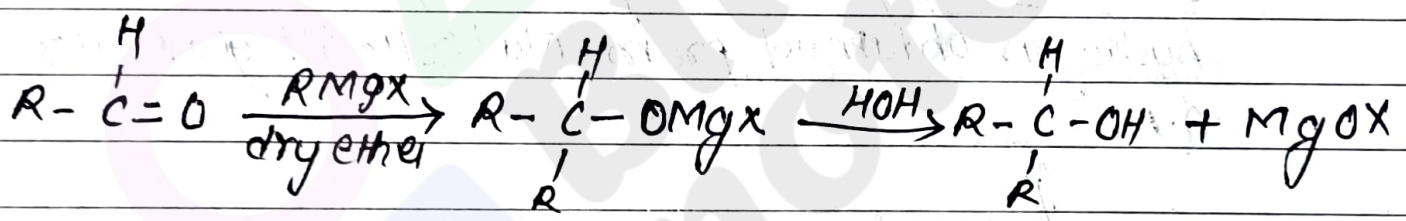


E.g:-

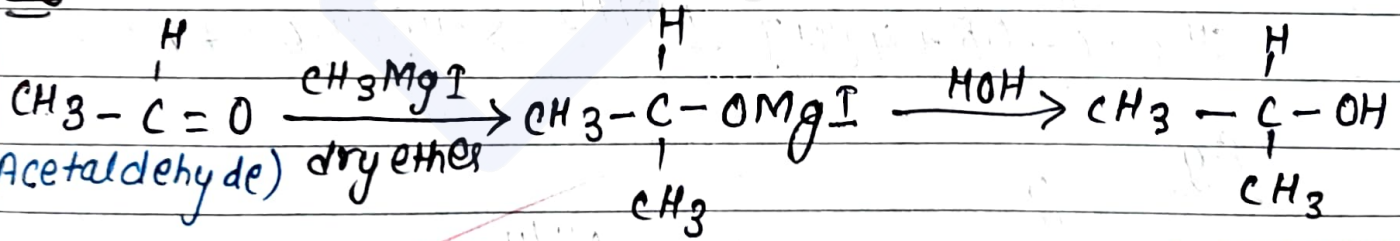


(II) Aldehydes other than formaldehyde gives with grignard reagent gives secondary alcohol (2^0-alcohol)

eg G.R



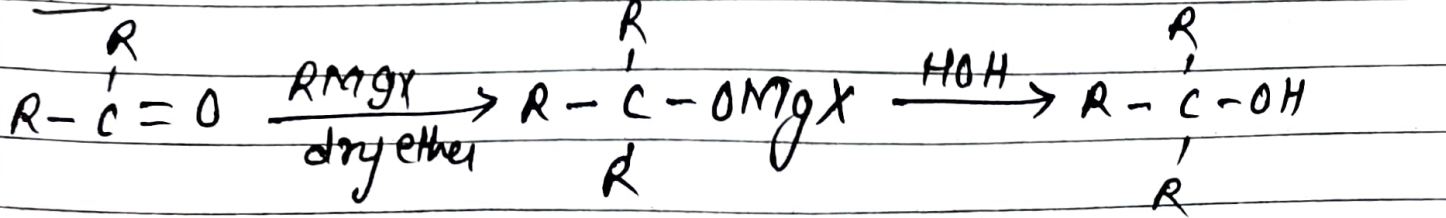
E.g



2-propanol.

(III) Ketones with grignard reagent give tertiary alcohol (3^0)

G.R



E.g :-

$$CH_3-\underset{\displaystyle O}{\overset{\displaystyle CH_3}{\overset{|}{C}}}=O \xrightarrow[\text{dryether}]{CH_3MgI} CH_3-\underset{CH_3}{\overset{CH_3}{\overset{|}{C}}}-OMgI \xrightarrow{HOH} H_3C-\underset{CH_3}{\overset{CH_3}{\overset{|}{C}}}-OH$$

2-propanol.

2-methyl-propane-2-o

(3) From primary amines → By the action of nitrous acid on primary amines gives alcohol.

G.R

$$R-NH_2 + HNO_2 \xrightarrow[\text{cold}]{NaNO_2/HCl} R-OH + N_2 + H_2O$$

E.g :- $CH_3-CH_2-NH_2 + HNO_2 \xrightarrow[\text{cold}]{NaNO_2/HCl} CH_3CH_2OH + N_2 + H_2O$

(4) From reduction of esters → By reduction of ester with H_2 in presence of Ni or Pb or Pt or nascent hydrogen obtained from Na/C_2H_5OH gives alcohol

G.R :-

$$CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-OR+4[H] \xrightarrow{Ni/H_2} CH_3CH_2OH + ROH$$

E.g

$$CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-OC_2H_5+4[H] \xrightarrow{Ni/H_2} CH_3CH_2OH + C_2H_5OH$$

Industrial preparation of ethanol →

1) Oxo-process:

In this process alkene reacts with water gas ($CO + H_2$) in presence of cobalt carbonyl catalyst under high pressure to give aldehyde which on catalytic hydrogenation gives alcohol.

$$CH_2=CH_2 + CO + H_2 \xrightarrow{[Co(CO)_4]_2} CH_3CH_2CHO$$

Ethene (water gas) → propanaldehyde.

$$CH_3CH_2CHO \xrightarrow{H_2/Ni} CH_3CH_2CH_2OH$$

propanol.

- Note: Methyl and ethyl alcohol cannot prepared by this method.

(2) Fermentation of sugar:-

Fermentation is a process in which complex compounds are broken into simpler compounds by the action of enzymes. Alcohols are obtained by fermentation of sugar and starch.

It is the oldest method for the preparation of alcohol.

The mother liquor left after crystallization of sugar is called molases. It is rich source of sugar like fructose, glucose and sucrose. It is diluted with water to about 10% sugar contents and yeast is added to it.

The enzyme invertase present in the yeast converts sucrose into glucose and fructose.

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{Invertase}} C_6H_{12}O_6 + C_6H_{12}O_6$$

Sucrose. → Glucose + fructose

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The enzymes zymase convert glucose and fructose to alcohol.

$$C_6H_{12}O_6 \xrightarrow{\text{zymase}} 2C_2H_5OH + 2CO_2$$

(G or F) ethanol

The permentation completes in 5 days. The fermented liquor contain 8-10% ethanol is called wash. the wash on frictional distillation gives 96.5% ethanol which is known as Rectified spirits (96.5)%.

(3) Hydroboration of Alkenes → Alkenes react with diborane (used for the prepn of 1°-alcohol) -ne, B_2H_6 to form trialkyl boranes. Diborane adds as borane, BH_3. The positive part of BH_3 is the boron, the negative part is hydrogen. Trialkyl boranes are used for making primary alcohols by reaction with alkaline aqueous solution of hydrogen peroxide.

I. $3CH_3-CH=CH_2 + BH_3 \longrightarrow (CH_3CH_2CH_2)_3B$

Tripropyl borane.

II) $(CH_3CH_2CH_2)_3B + H_2O_2 \xrightarrow{OH^-} 3CH_3CH_2OH + H_3BO_3$

Propanol.

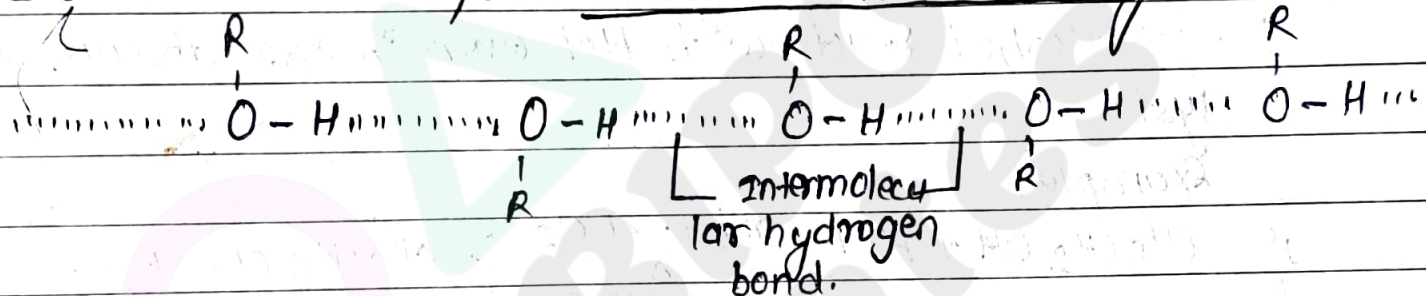
n-propyl alcohol

→ The overall result of the above reaction appears to be anti-Markonikov addition of H_2O to a double bond.

Physical properties of Monohydric alcohols:-

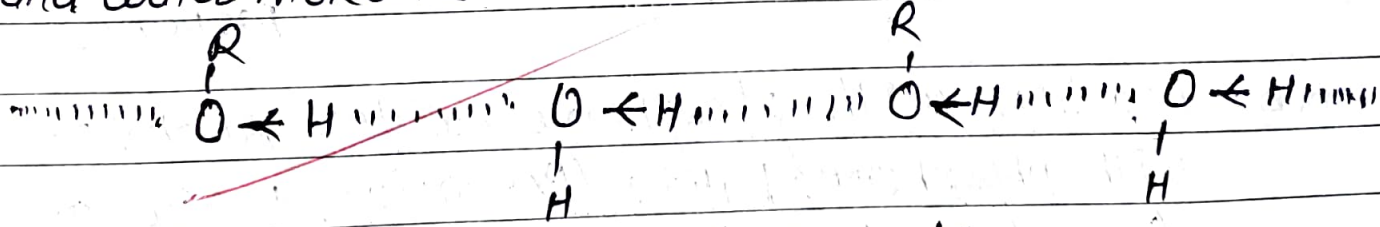
(1) Physical state:→ Lower alcohols are colorless, volatile and tonic liquid having alcoholic smell and burning nature.
Higher members are colorless and odourless waxy solids.

(2) Boiling point → Alcohols have higher bpt. than that of corresponding alkanes, alkyl halides and ethers. It is because in alcohols the H-atom is directly bonded to the highly electronegative O-atom and can form <u>intermolecular H-bonding</u>.



∴ Among isomeric alcohols, as branching increases bpt decreases.

(3) Solubility :→ Lower alcohols (C_1 to C_3) are completely soluble in water. It is due to formation of H-bonds between alcohol and water molecules.



(4) Density :- Alcohols are lighter than water.

Chemical properties

A. Cleavage of $R:OH \rightarrow R \div OH$

1a) Reaction with Hydrogen halide:- Alcohols reacts with hydrogen halides to give alkyl halides.

General reaction:

$$R-OH + HX \longrightarrow R-X + H_2O.$$

The order of reactivity is $3^0 > 2^0 > 1^0$ alcohol and $HI > HBr > HCl$ which increases with the size of halogen atom.

∴ 1^0 and 2^0 alcohol react with HCl in the presence of anhydrous $ZnCl_2$ as catalyst.

∴ 3^0 alcohol react with HCl even in the absence of catalyst.

Example:-

1^0 $CH_3CH_2OH + HCl \xrightarrow[\Delta]{\text{anhy. } ZnCl_2} CH_3CH_2Cl + H_2O.$

2^0 $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3 + HCl \xrightarrow[\Delta]{\text{anhy. } ZnCl_2} CH_3-\underset{\underset{Cl}{|}}{CH}-CH_3 + H_2O$

3^0 $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH \xrightarrow{\text{Room Temp}} H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-Cl + H_2O$

3^0 (2-methyl-2propanol) — 2-chloro-2-methyl propane

(b) Reaction with phosphorous halide:- Alcohol reacts with phosphorous halide (PX_5 or PX_3) to give alkyl halide

General reaction:

$$R-OH + PX_5 \xrightarrow{\Delta} R-X + POX_3 + HX.$$

$$3R-OH + PX_3 \xrightarrow{\Delta} 3R-X + H_3PO_3.$$

Example:

$$CH_3CH_2-OH + PCl_5 \xrightarrow{\Delta} CH_3CH_2Cl + POCl_3 + HCl$$

$$3\,CH_3CH_2OH + PCl_3 \xrightarrow{\Delta} CH_3CH_2Cl + H_3PO_3.$$

(c) Reaction with ($SOCl_2$) thionyl chloride → Alcohols react with $SOCl_2$ to give alkyl chloride.

G.R $R-OH + SOCl_2 \xrightarrow{Pyridine} R-Cl + SO_2\uparrow + HCl\uparrow$

Example

$CH_3CH_2OH + SOCl_2 \xrightarrow{Pyridine} CH_3CH_2Cl + SO_2\uparrow + HCl\uparrow$

→ This is most suitable method to prepare alkyl halide because side products are gases easily escape out leaving alkylhalide in pure form.

(2) Reaction with reactive metals like Na, K, Li →

Alcohols react with highly reactive metals like Na, K, Li, Mg, Al etc to evolve H_2 gas and form metal alkoxide.

G.R :-

$2R-OH + 2Na \longrightarrow 2R\overset{\ominus}{O}\overset{\oplus}{Na} + H_2$

Example:-

$2CH_3CH_2OH + 2Na \longrightarrow 2CH_3CH_2ONa + H_2\uparrow$

Sod. ethoxide

$2CH_3CH_2OH + Mg \longrightarrow (CH_3CH_2O)_2Mg + H_2\uparrow$

Magnesium ethoxide.

$2CH_3OH + 2K \longrightarrow 2CH_3OK + H_2\uparrow$

Potassium methoxide.

→ In this reaction alcohol act as weak acid. It's because of high electronegativity of O-atom. But the alcohols are weaker acid than water. It is due to presence of +I electron releasing alkyl group on the alcohols.

$(R \rightarrow O-H)$ $(H-O \leftarrow H)$

The acid strength of alcohol decreases with increases in the number of alkyl groups. Hence the order of acid strength follows the order:-

$$R-CH_2-OH > R-\underset{R}{\overset{|}{CH}}-OH > R-\underset{R}{\overset{R}{\overset{|}{C}}}-OH$$

- **Esterification process:-**

Alcohols when heated with carbonylic acid in the presence of conc. H_2SO_4 gives esters. This reaction is known as esterification.

$$\underset{\text{G.R}}{R-\overset{O}{\overset{\|}{C}}-OH} + H-OR' \xrightleftharpoons{\text{conc. } H_2SO_4} \underset{\text{ester}}{R-\overset{O}{\overset{\|}{C}}-OR} + H_2O$$

H_2SO_4 act as dehydrating agent and it is reversible reaction.

Example:-

1) $CH_3-\overset{O}{\overset{\|}{C}}-OH + HO-C_2H_5 \rightleftharpoons CH_3-\overset{O}{\overset{\|}{C}}-OC_2H_5 + H_2O$
ethyl ethonate.

2) $CH_3-\overset{O}{\overset{\|}{C}}-OH + HO-CH_3 \rightleftharpoons CH_3-\overset{O}{\overset{\|}{C}}-OCH_3 + H_2O$
methyl ethonate.

3) $H-\overset{O}{\overset{\|}{C}}-OH + HOC_2H_5 \rightleftharpoons H-\overset{O}{\overset{\|}{C}}-OC_2H_5 + H_2O$.
ethyl methonate.

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4) Dehydration of alcohol → Alcohol when heated with conc. H_2SO_4 or their vapours are passed over heated alumina undergo dehydration to form alkene.

OR:-

$$-\overset{|}{C}-\overset{|}{C}- \xrightarrow[Al_2O_3 \text{ at } 350^\circ C]{\text{conc } H_2SO_4 \, 170^\circ C} -\overset{|}{C}=\overset{|}{C}- + H_2O$$

(H and OH on the two carbons)

Example:-

1) $CH_3CH_2OH \xrightarrow[\text{or } Al_2O_3]{\text{conc. } H_2SO_4, \, 170^\circ C} CH_2=CH_2 + H_2O$

[Removal of OH and H takes at near by C-atom]

2) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3 \xrightarrow[100^\circ C]{\text{conc. } H_2SO_4} CH_3-CH=CH_2 + H_2O$

3) $CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-CH_3$

→ $CH_3-CH_2=CH_2 + H_2O$
1-butene
1-butene
(Minor product)

→ 2-butene
$CH_3-CH=CH-CH_3 + H_2O$
(Major product)

* Note:-

A) The reaction of ethanol with conc. H_2SO_4 gives different products under different conditions.

(I) Ethanol reacts with conc. H_2SO_4 at 100°C to give ethyl hydrogen salt

$$CH_3CH_2OH + H_2SO_4 \xrightarrow{100^\circ C} CH_3CH_2OSO_3H + H_2O$$

II) Excess ethanol reacts with conc. H_2SO_4 at 140°C to give diethyl ether.

$$CH_3CH_2OH + H_2SO_4 \xrightarrow{100^\circ C} CH_3CH_2OSO_3H + H_2O.$$

$$CH_3-CH_2OSO_3H + HOC_2H_5 \xrightarrow{140^\circ C} CH_3CH_2-O-CH_2CH_3 + H_2O.$$

III) Ethanol reacts with excess conc. H_2SO_4 at 170°C to give ethene.

$$CH_3-CH_2OH + H_2SO_4 \xrightarrow{100^\circ C} CH_3CH_2OSO_3H + H_2O$$

$$CH_3-CH_2OSO_3H \xrightarrow{170^\circ C} CH_2=CH_2 + H_2SO_4$$

ethene.

Vimp

4) Oxidation of alcohol → Oxidation of alcohol can be carried out with acidic or alkaline $KMNO_4$ or acidified $K_2Cr_2O_7$ or $Na_2Cr_2O_7$.

The nature of product formed depends on the types of alcohol used.

(I) primary alcohols (1°) are easily oxidised to aldehyde at first and then to carboxylic acids having same number of carbon atom.

General Rxn →

$$R-CH_2OH \xrightarrow[K_2Cr_2O_7/H^+]{[O]} R-CHO \xrightarrow{[O]} RCOOH$$

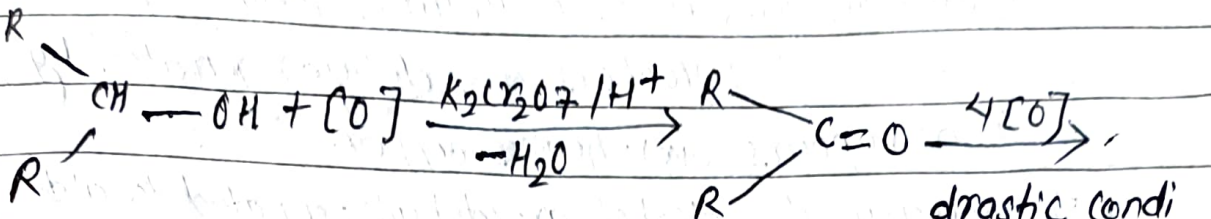
Eg:-

$$CH_3CH_2OH + [O] \xrightarrow[-H_2O]{K_2Cr_2O_7} CH_3CHO \xrightarrow{[O]} CH_3COOH$$

[2C] (2) (2C)

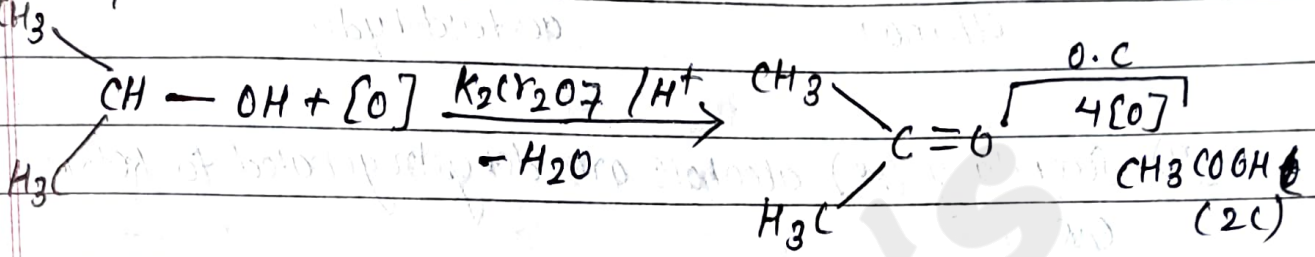
(II) 2° alcohol are easily oxidised to ketones having same no of carbon atoms. The ketones is further oxidised only under drastic condition to give carboxylic acid having less number of carbon atom.

G.R

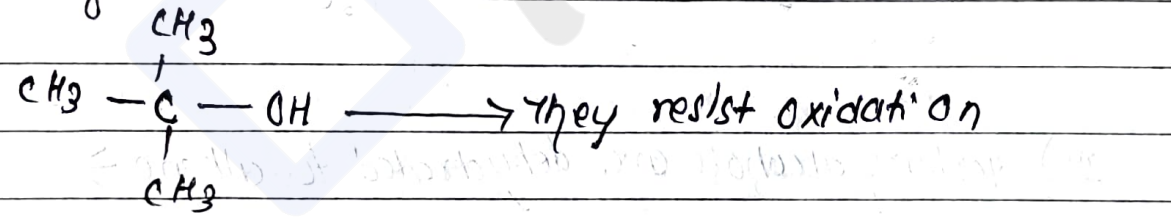


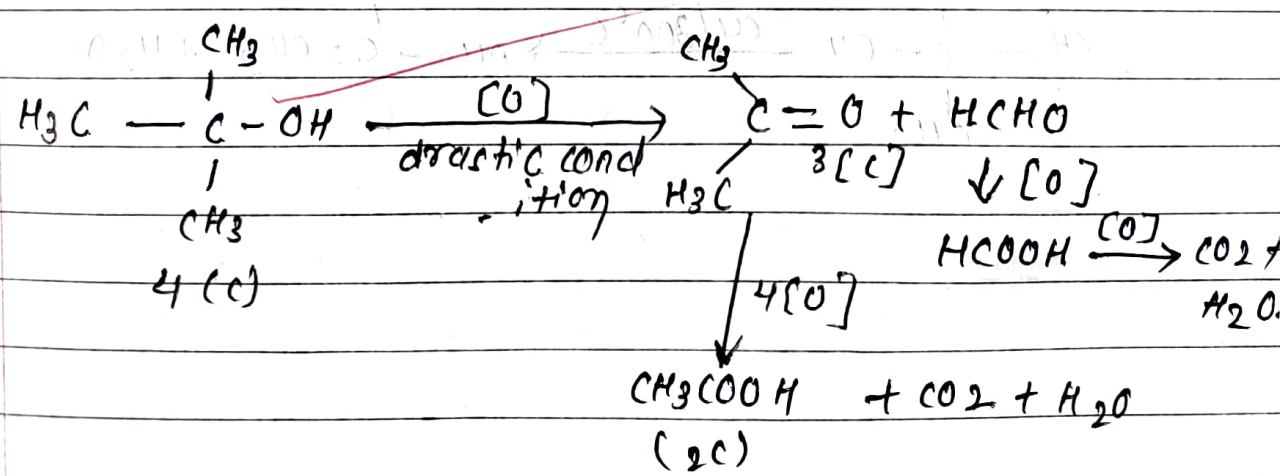
$RCOOH + H_2O + CO_2$

Example:-



III. Tertiary (3°) alcohol do not contain hydrogen on carbon carrying -OH (hydronyl group) therefore they resist oxidation. Under drastic condition they are oxidize to ketones having less number of carbon atom and then to carbonylic acids having less number of carbon atom mixture of





6. Reduction of alcohol (catalytic dehydrogenation).

Alcohols are dehydrogenated by passing their vapours over heated copper.

(I) primary (1°) alcohol are dehydrogenated to aldehyde.

G.R →

$$R-CH_2OH \xrightarrow{Cu/300^\circ C} R-CHO + H_2$$

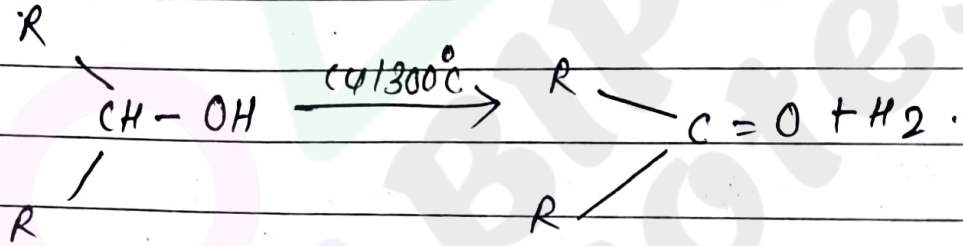
Example:-

$$CH_3CH_2OH \xrightarrow{Cu/300^\circ C} CH_3CHO + H_2$$

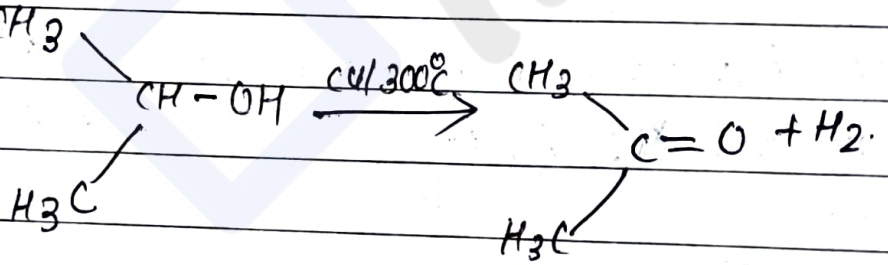
Ethanol → acetaldehyde

II) Secondary (2°) alcohols are dehydrogenated to ketones

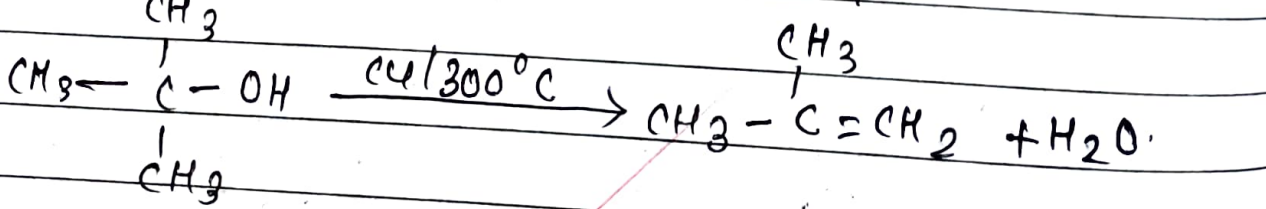
G.R



Example:-



III) Tertiary alcohols are dehydrated to alkene →



DATE

Laboratory Test of ~~alcohol~~ ethanol →

① Esterification test :- Ethyl alcohol reacts with acetic acid and when heated in the presence of conc H_2SO_4 to form ester, ethyl acetate having pleasent fruity smell.

$$CH_3-\overset{O}{\overset{\|}{C}}-OH + HOC_2H_5 \underset{}{\overset{conc.\ H_2SO_4}{\rightleftharpoons}} CH_3-\overset{O}{\overset{\|}{C}}-OC_2H_5 + H_2O$$

(pleasant fruity smell)

→ This test is given by ethanol & methanol.

② Iodoform test :→ In this test ethyl alcohol is warmer with iodine in the presence of alkali - pale yellow crystals of iodoform are formed

$$2NaOH + I_2 \longrightarrow NaOI + NaI + H_2O.$$

$$CH_3CH_2OH \xrightarrow[-NaI, -H_2O]{NaOI} CH_3CHO \xrightarrow[-3NaOH]{3NaOI} CI_3CHO \xrightarrow{NaOH} CHI_3 + HCOONa$$

Iodoform

→ This Iodoform test is given by alcohols having — $CH_3-\overset{OH}{\overset{|}{CH}}-$ all methyl ketones and acetaldehyde but not by methanol.

* Absolute alcohol → Absolute alcohol is 100% pure ethyl alcohol It is obtained from rectified spirit by distillation.

* Denaturated or methylated spirit → Ethyl alcohol is made unfit for drinking purpose by adding poisonous substances like methyl alcohol or acetone or pyridine, such alcohol is called denatured alcohol.

Wood spirit → Methyl alcohol is called wood spirit. It is poisonous in nature. It cause blindness and death.

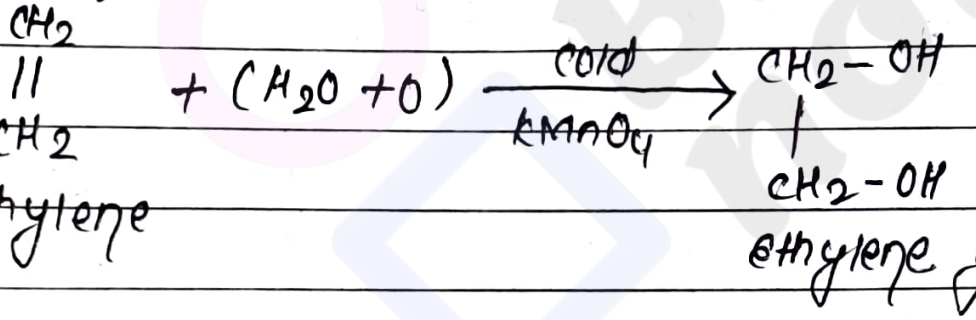
Rectified spirit → ethyl alcohol containing 5% water and ethyl alcohol 95% is called rectified spirit.

Alcoholic Beverage → The largest use of ethyl alcohol is a beverages. Wines contains about 12% ethyl alcohol, Beer contains about 4% whisky and brandy contain 40-50% ethyl alcohol the alcoholic content of beverage is indicated by a measure known as proof spirit.

Ethan-1,2-diol (Glycol) →

preparation → (Lab)

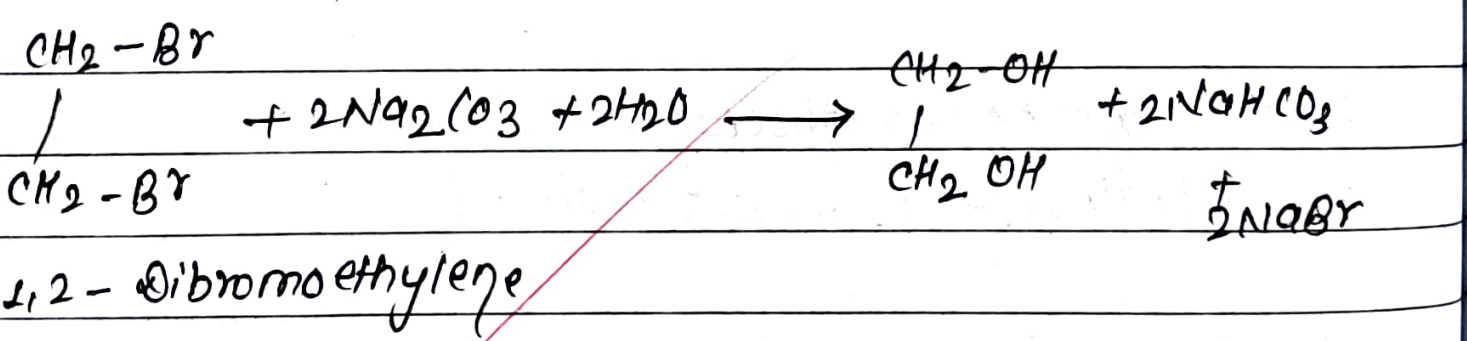
1. By passing ethene through cold and dilute alkaline potassium permagnate solution.



ethylene

ethylene glycol.

2. By hydrolysis of 1,2-dibromo ethane with aqueous Na_2CO_3 solution

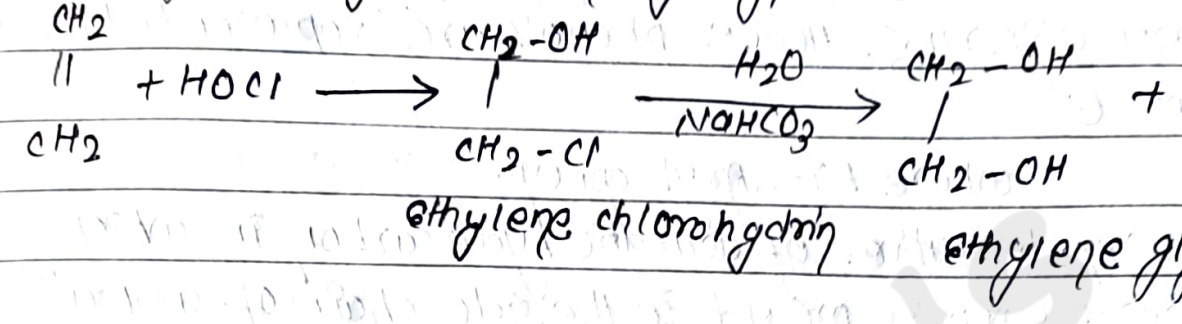


1,2 - Dibromoethylene

DATE

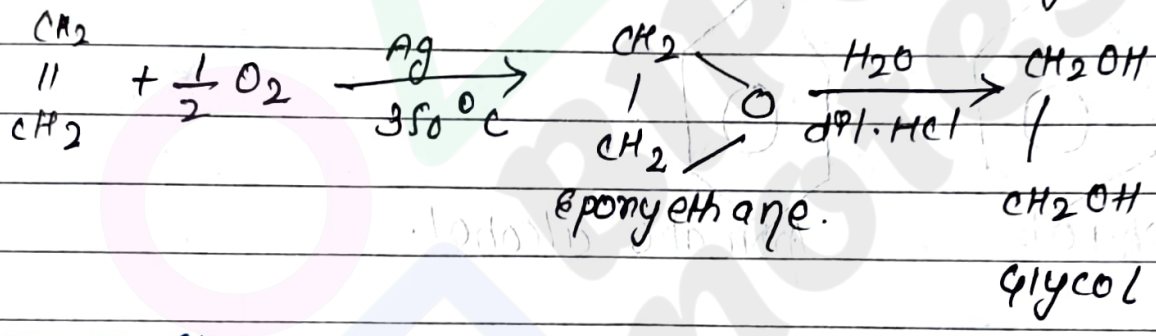
Industrial preparation:-

1. By the hydrolysis of ethylene chlorohydrin, which in turn is obtained by passing ethene through hypochlorous acid.



ethylene chlorohydrin — ethylene glycerol

2. By the hydrolysis of epoxyethane which in turn is obtained by heating ethene with air presence of silver (Ag) as catalyst.



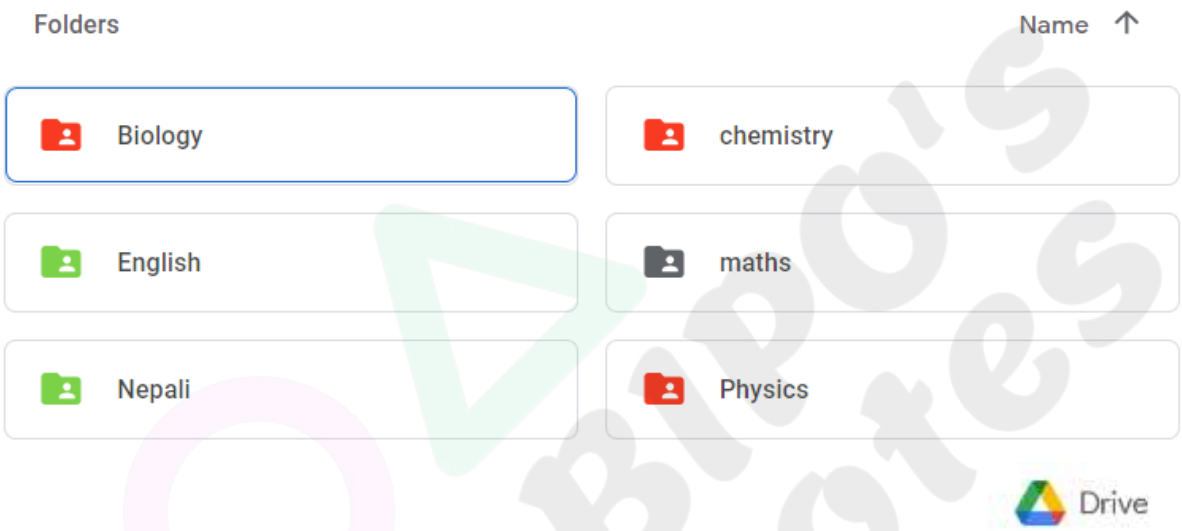
Uses of ethylene glycol →

1. As an antifreeze for automobile radiators and a coolant for aeroplane motor.
2. In the manufacture of dacron (terylene) and other polymer.
3. As solvent for stamp pad ink.
4. In the preparation of nitroglycerol (explosive) and solvents like dioxane, celloslane etc.
5. As lubricant and preservative.

Bipin Khatri

(Bipo)

Class 12 complete notes and paper collection.



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