DATE:

Alcohol

Alcohols are compounds in which hydroxyl group (-OH) is attached to saturated carbon atom. e.g CH_3OH, CH_3CH_2OH

Classification :-

They are classify into two ways.

(a) According to the methyl group

(b) According to the hydroxyl group

(a) On the basis of nature of carbon atom attached with -OH group of mono-hydric alcohol can be further classified as 1° (Primary alcohol, 2° (Secondary alcohol) 3° (tertiary alcohol) depending on the no. of carbon atom bound to the hydroxyl-bearing carbon.

primary alcohol →
R(CH)OH R may be H or alkyl gr.

$R-CH_2-OH$

Secondary alcohol → $R_2-CH-OH$

Tertiary alcohol → R_3-C-OH

(b) According to the hydroxyl groups —

i) Monohydric alcohol — The compounds contains one -OH gr.

CH_3-OH, CH_3CH_2-OH e.

ii) alcohol — contains two -OH grs.

$CH_2(OH)-CH_2(OH)$

iii) Trihydric alcohol — These contains 3-OH grs.

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

DATE: Methods of Preparations —

(i) Hydrolysis of alkyl halide :- Alkyl halide reacts with aq NaOH to form alcohol.

$$R-X + NaOH \xrightarrow[\Delta]{H_2O} R-OH + NaX$$

(ii) Hydrolysis of alkenes — Alkenes reacts with sulphuric acid forms alkyl hydrogen sulphate which on hydrolysis gives alcohol.

$$CH_3-CH=CH_2 + \overset{+}{H}\overset{\cdot\cdot}{O}SO_3H \longrightarrow CH_3-\underset{\cdot\cdot}{\underset{|}{C}}H-CH_3$$

$$CH_3-CH(OSO_2H)-CH_3 + H-O-H \xrightarrow{\Delta} CH_3-CH(OH)-CH_3 + H_2SO_4$$

Isopropyl alcohol

(iii) Hydroboration-oxidation of Alkene — Alkenes react with diborane. B_2H_6 to form trialkylboranes. Diborane adds as borane BH_3. The positive part of BH_3 is the boron, the negative part is hydrogen

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

Propylene — Tripropylborane

DATE:

Trialkyl boranes are used for making primary alcohol by reaction with alkaline aq. solution of hydrogen peroxide.

$$(CH_3CH_2CH_2)_3B + H_2O_2 \xrightarrow{OH^-} 3CH_3CH_2CH_2OH + H_3BO_3$$

4. Hydrolysis of esters → Alcohol may be prepared by base as acid catalysed hydrolysis of esters.

$$R-\overset{O}{\overset{\|}{C}}-OR + H-OH \xrightarrow[\Delta]{H^+} R-\overset{O}{\overset{\|}{C}}-OH + R-OH$$

5. Catalytic hydrogenation of Aldehyde and ketones — Catalytic hydrogeration also reduces aldehyde and ketone to 1° and 2° alcohol respectively. using H_2 and Pd

$$CH_3-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-H \xrightarrow[Pd]{H_2} CH_3CH_2CH_2-\underset{H}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-H$$

Butanal — 1-Butanol

Reduction of carbonyl compd with metal hydride.

$$CH_3CH_2-\overset{O}{\overset{\|}{C}}-H \xrightarrow[2.\ H_2O]{1.\ LiAlH_4} CH_3CH_2-\underset{H}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-H$$