Alcohols :

B.Sc. Part I (Hons.)
Organic chemistry.

— Dr. Manju Kumari
Maharaja college, Ara.

Chemical Properties of Monohydric alcohol

Dehydrogenation :

Primary and Secondary alcohols undergo dehydrogenation in Vapour phase in the presence of Copper catalyst, forming corbonyl Compounds.

$$R-CH_2OH \xrightarrow[300^\circ C]{Cu} R-CHO + H_2O$$

$$\begin{matrix} R \\ R' \end{matrix}\!\!>\!CHOH \xrightarrow[300^\circ C]{Cu} \begin{matrix} R \\ R' \end{matrix}\!\!>\!C=O + H_2$$

Tertiary alcohols are not dehydrogenated. They undergo dehydration to give alkene.

$$R-\overset{CH_3}{\underset{R}{C}}-OH \xrightarrow[300^\circ C]{Cu} \begin{matrix} R \\ R' \end{matrix}\!\!>\!C=CH_2 + H_2O$$

Tert. alcohol.

Oxidation : The main oxidising agents are acidic and alkaline $KMnO_4$, $K_2Cr_2O_7$, CrO_3, dil HNO_3

(i) **Primary alcohols** :—

$$R-CH_2-OH \xrightarrow{[O]} R-CHO \xrightarrow{[O]} RCOOH$$

(ii) **Secondary alcohols** are oxidised to ketones. This on further oxidation under drastic condition, forms mixture of acids each having lesser number of carbon than the alcohol.

$$R-\underset{OH}{\underset{|}{CH}}-R' \xrightarrow{[O]} R-\overset{O}{\overset{||}{C}}-R' \xrightarrow{[O]} \text{Mixture of acids.}$$

$$C_2H_5-\underset{OH}{\underset{|}{CH}}-CH_3 \xrightarrow{H^+/Cr_2O_7^{2-}} CH_3-\overset{O}{\overset{||}{C}}-C_2H_5 \xrightarrow{K_2Cr_2O_7,\ H^+}$$

$$CH_3CH_2COOH + CH_3COOH + HCOOH$$

Tertiary alcohols :

Tertiary alcohols do not undergo oxidation, rather in the presence of acid along with the oxidising agent they undergo dehydration forming alkenes which are oxidised to acids having fewer number of Carbon atoms than the parent alcohol.