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17/ENG06/024
Mechanical Engineering

(a) Primary alcohols: Primary alcohols are those alcoh
where the carbon atom of the hydroxyl group (O
is attached to only one alkyl group. The complex
of the alkyl chain is unrelated to the classifica
ion of any alcohol considered as primary. The
existence of only one linkage -OH group and an
alkyl group and thing that qualifies alcohol as a
primary.

Examples

(i) Ethanol CH_3-CH_2-OH

(ii) Propan-1-ol $CH_3-CH_2-CH_2-OH$

(b) Secondary alcohols: Secondary alcohols are t
e where the carbon atom of the hydroxyl group i
attached to two alkyl groups on either side. Th
alkyl groups present may be either structura
identical or even different.

Examples

(i) Propan-2-ol $CH_3-\underset{OH}{\underset{|}{CH}}-CH_3$

(ii) Butan-2-ol $CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-CH_3$

(2) In the Grignard synthesis of Alkanols, react a
named Grignard reagent with $CH_3CH_2CH_2CH$
$C-OCH_2CH_2CH_3$

$$CH_3CH_2MgBr + CH_3CH_2CH_2CH_2-\underset{CH_2CH_2CH_3}{\overset{O}{\overset{\|}{C}}} \longrightarrow CH_3CH_2-\underset{CH_3CH_2CH_2CH_3}{\underset{|}{C}}-O-MgBr$$

$$CH_3CH_3CH_3$$

Dilute acid is added to this to hydrolyze it.

$$CH_3CH_2CH_2CH_3$$
$$CH_3CH_2-C-O-MgBr + H_2O \xrightarrow{H_3O^+} CH_3CH_2-C-OH$$
$$CH_3CH_2CH_3 \qquad\qquad CH_3CHCH_3$$

(3) Firstly, the starch containing materials e.g potatoes are warmed with malt to 60°C for a specific time. The starch is converted into maltose by the enzyme diatose contained in malt.

$$2(C_6H_{10}O_5)n + nH_2O \xrightarrow[60°C]{\text{diatose}} nC_{12}H_{22}O_{11}$$
maltose

The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase at 15°C

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow[15°C]{\text{maltose}} 2C_6H_{12}O_6$$
glucose

The glucose at constant 15°C is then converted into alcohol by the enzyme zymase contained also in yeast.

$$C_6H_{12}O_6 \xrightarrow[\text{zymase}]{15°C} 2CH_3CH_2OH + 2CO_2$$
Ethanol

(4) Reduction of Alkanone

$$CH_3-C(=O)-CH_3 + 2[H] \xrightarrow{LiAlH_4} CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle OH}{\underset{|}{\overset{|}{C}}}}-H$$
Secondary alcohol

Reduction of Alkanal

$$CH_3-C(=O)-H + 2[H] \xrightarrow{LiAlH_4} CH_3-\underset{\displaystyle H}{\overset{\displaystyle OH}{\underset{|}{\overset{|}{C}}}}-H$$
Primary alcohol