CHEM 102

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COURSE: CHEM 102

1. There are two major classification of alkanol. Alkanol is also known as alcohols.

* Primary alkanol (1°)
* Secondary alkanol (2°)

Primary alkanol

The carbon which carries the -OH group is only attracted to one alkyl group. Some examples of primary alkanol include:

CH_3CH_2-OH Ethanol

$CH_3-CH_2-CH_2-OH$ propan-1-ol

$CH_3-CH(CH_3)-CH_2-OH$ 2-methylpropan-1-ol

NOTE: It doesn't matter how complicated the attatched alkyl group is in each case, there is only one linkage to an alkyl group from the CH_2 group holding the -OH group. There is an exception to this. Methanol, CH_3OH, is counted as a primary alcohol even though there are no alkyl group attatched to the carbon with the -OH group on it.

Secondary alkanol

The carbon with one -OH group attatched is joined directly to two alkyl groups, which may be the same or different. Example;

$CH_3-CH(OH)-CH_3$ Propan-2-ol

$CH_3-CH(OH)-CH_2-CH_3$ butan-2-ol

$CH_3-CH_2-CH(OH)-CH_3$ Pentan-3-ol

2. $CH_3CH_2CH_2MgCl + CH_3CH_2CH_2CH_2C=OCH_2CH_2CH_2CH_3$

$$CH_3CH_2CH_2C(CH_2CH_2CH_2CH_3)(OMgCl) \longrightarrow CH_3CH_2CH_2C(CH_2CH_2CH_2CH_3)(OH) + Mg(OH)Cl$$

3. The industrial manfacturing of ethanol is carried out by the process of FERMENTATION

Step 1: Hydrolysis of starch

Starch is hydrolyzed to maltose by an enzyme known as DIASTASE under 60°C.

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

(Starch) (Maltose)

Step 2: Conversion of maltose

Maltose is converted to glucose by an enzyme known as MALTASE under 15°C

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

(Maltose) (Glucose)

Step 3: Conversion of glucose

Glucose is converted into ethanol using an enzyme known as ZYMASE under 15°C

$$C_6H_{12}O_6 \xrightarrow[\text{Zymase (15°C)}]{\text{Yeast}} CH_3CH_2OH + 2CO_2$$

(Glucose) (Ethanol)

4. Alkanones and Alkanals can be reduced using $LiAlH_4$ or $(C_2H_5)_2O$

Alkanones: The reduction process of propanone is propanol.

$$CH_3CH_2CHO \longrightarrow CH_3CH_2CH_2OH$$

Alkanals: The reduction process of propanal to propanol

$$CH_3CH_2C=O \longrightarrow CH_3CH_2CH_2OH$$