AIWO TOLUWALASE ESTHER
19/MHS09/024
CHM102
DENTISTRY
MEDICINE AND HEALTH SCIENCES

CLASSIFICATION OF ALKANOLS

Classification based on the number of Hydrogen atoms attached to the carbon atom containing the hydroxyl group. The Primary alkanol; If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two; The secondary alkanol; If ~~the~~ it is one hydrogen atom attached to the carbon atom bearing the hydroxyl group. The Tertiary alkanol; If no hydrogen atom is attached to the carbon atom bearing the hydroxyl group. Examples are;

Primary Alkanol - Methanol (CH_3OH)
- Ethanol (CH_3CH_2OH)

Secondary Alkanol → 2 Methyl propan-2-ol
→ Propan-2-ol [$CH_3CH(OH)CH_3$]

Tertiary Alkanol → 2 Methyl propan-2-ol [$(CH_3)_3-C-OH$]
→ 2 Methyl butan-2-ol [$(CH_3)_3CH_2-C-OH$]

Classification based on the number of hydroxyl groups they possess; We have three types which are; Monohydric Alkanols, Dihydric Alkanols and Trihydric Alkanols and Polyhydric alkanols. Monohydric Alkanols have one hydroxyl group present in the alcohol structure. Dihydric Alcohols are also called Glycols have two hydroxyl groups present in the alcohol structure. Trihydric alkanols or triols have three hydroxyl groups present in the structure of the alkanols. Polyhydric alcohols or polyols have more than three hydroxyl groups.

Examples; Monohydric Alcohol - Propanol ($CH_3CH_2CH_2OH$)
Dihydric Alcohol - Ethane-1,2-diol ($CHOCH_2CH_2OH$)
Trihydric Alcohol - Propane-1,2,3-triol ($COHCH_2CH(OH))CH_2$
Polyhydric Alcohol - Heptane-2,3,4,5,6-pentaol

2 Grignard Synthesis

$CH_3CH_2CH_2CH_2C=O\,CH_2CH_2CH_3 + CH_3MgCl \rightarrow C_8H_{17}OMgCl \xrightarrow[\text{dil. acid}]{H^+\ OH^-} C_8H_{17}C-OH + Mg(OH)Cl$

Grignard Reagent – CH_3MgCl

Methyl Magnesium chloride

3 Industrial Production of Ethanol

Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes found in yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials includes molasses, cereals, etc and on warming with malt to 60°C and converted into Maltose by the enzyme diastase contained in the malt.

* $2(C_6H_{10}O_5)_n + nH_2O \xrightarrow[\text{diastase}]{60^\circ C} nC_{12}H_{22}O_{11}$

Carbohydrate. maltose

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

7 $C_{12}H_{22}O_{11} + H_2O \xrightarrow[\text{maltase}]{15^\circ C} 2C_6H_{12}O_6$

maltose glucose

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

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

Glucose Ethanol

REDUCTION OF ALKANALS AND ALKANONE

4 **Alkanals**

$HCHO \xrightarrow{LiAlH_4/(C_2H_5)_2} HCH_2OH$

Methanal — Methanol

Alkanones

$CH_3CH_3C{=}O \xrightarrow{LiAlH_4/(C_2H_5)_2O} CH_3\,CH_3\,CHOH$

Propanone — Propan-2-ol