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19/10/2012
Chemistry 102 (1)

① Classification of alcohols

a) Alcohols are classified based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group is 2 or 3, it is called primary or 1° alcohol. If it is one hydrogen atom, it is called a secondary alcohol and if it is no hydrogen atom attached to the carbon atom it is called tertiary or 3° alcohol.
e.g. methanol, CH_3OH ; Butan-2-ol, $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$
Methylpropan-2-ol, $(\text{CH}_3)_3\text{C-OH}$

b) They are also classified based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols, also called glycols, have two hydroxyl groups present in the alcohol structure while trihydric alcohols have three hydroxyl groups present in the structure of the alcohol. Polyhydric or polyols have more than 3 hydroxyl groups.

E.g.

Propanol (monohydric alcohol) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

Ethene 1,2-diol (dihydric alcohol) $\text{HOCH}_2\text{CH}_2\text{OH}$

Propane 1,2,3-triol (trihydric alcohol)

$\text{C}(\text{OH})_3$

Hexane 2,3,4,5,6-pentol (polyhydric alcohol)

2) Grignard synthesis of an alcohol

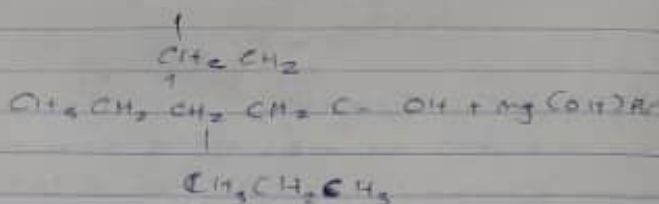
using $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}=\text{O} + \text{CH}_3\text{CH}_2\text{CH}_3$

$\text{CH}_3\text{CH}_2\text{MgBr}$

\downarrow
 CH_3CH_2

$\text{CH}_3\text{CH}_2\text{CH}_2\text{C}=\text{O} + \text{MgBr}$

\downarrow
 $\text{C}(\text{H})_2\text{CH}_2\text{CH}_3$



3- butylohexane-3-ol

3) INDUSTRIAL Preparation of Ethanol
 Carbohydrates such as starch are major group of natural
 compounds that can't be made to yield ethanol by the
 biological process of fermentation

Step I

The starch containing materials include ~~starch~~ ^{potatoes,}
 Polishes, cereals, etc are on warming with moist heat
 for a specific period of time are converted into
 maltose by the enzyme diastase contained in the malt
 $\text{C}_6\text{H}_{10}\text{O}_5 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$

Step II

The maltose is broken down into glucose on
 addition to yeast which contains the enzyme maltase
 at a temperature of 16°C
 $\text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$

Step III

The glucose at constant temperature of 15°C is
 then converted to alcohol by the enzyme
 maltase containing yeast
 $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$

a) Products obtained in the reduction of alkenals and alkenone

Aldehydes and ketones are reduced to primary and secondary alcohols respectively by reacting with hydrogen in the presence of a platinum or nickel catalyst or with aluminium isopropoxide or with complex metal hydride such as lithium tri-tert-butoxyaluminum hydride $(LiAlH_4)$ or sodium tetrahydridoborate $(NaBH_4)$

