

Akang Kelvin Nsikak

19/ENG02/003

Computer Engineering

CHM 102

1a) This is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group to the carbon atom containing the ~~hydroxyl group~~ If the numbers of hydrogen atoms attached to the carbon bearing the hydroxyl group are three or two, it is called primary alcohol (1°). If it is one hydrogen atom, it is called secondary alcohol (2°) and if none, it is called tertiary alcohol (3°).

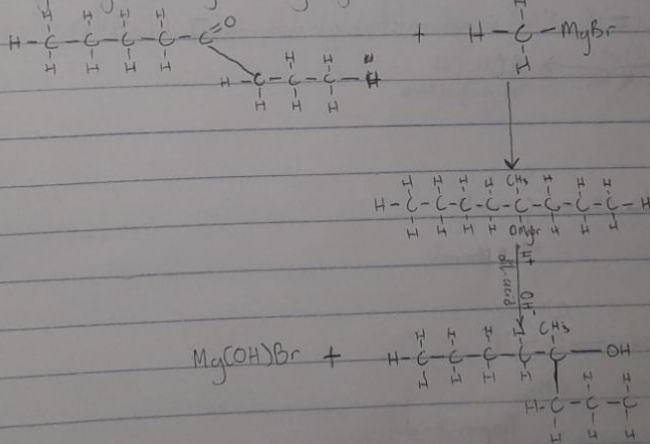
Example: CH_3OH - methanol (1°), $(\text{CH}_3)_2\text{CHOH}$ - 2-methylpropan-2-ol (3°)

b) This is based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols, ^{which} are also called glycols, have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups.

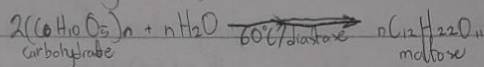
Examples: $\text{HOCH}_2\text{CH}_2\text{OH}$ - ethane-1,2-diol (dihydric alcohol), $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ - propanol (monohydric alcohol)

2) Grignard Synthesis of Alcohols:

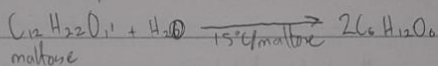
Grignard agent: CH_3MgBr (Methyl magnesium bromide)



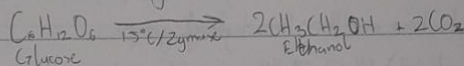
3) Carbohydrates such as starch are a major group of natural compounds that can be made to yield ethanol by the biological process of fermentation. The biological catalysts, enzymes, found in yeast, break down the carbohydrate molecules into ethanol to give a yield of 99%. The starch containing materials include malasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt.



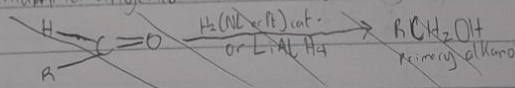
The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C:



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



4) Alkanals and alkanones are reduced to primary or secondary alkanols respectively by reaction with hydrogen in the presence of a platinum or nickel catalyst or with aluminium isopropoxide (the Meerwein-Ponndorf reaction) or with complex metal hydride such as lithium tetrahydridoaluminate(III) (LiAlH₄) or sodium tetrahydridoborate(III) (NaBH₄).



Examples:

