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**DEPT: CIVIL ENGINEERING**

**MATRIC NO: 19/ENG03/007**

**CHM 102 ASSIGNMENT**

1. Classifications of alcohols with examples
2. 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 are three or two, it is called primary alcohol (1°). If it is one hydrogen atom it is called secondary alcohol (2°) and if no hydrogen atom is attached, it is called tertiary alcohol (3°). Examples are CH3OH Methanol (1°), CH3CH2OH Ethanol (1°).
3. Based on number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called glycols have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups and polyhydric or polyols have more than three hydroxyl groups. Examples are CH3CH2CH2OH Propanol (Monohydric alcohol), HOCH2CH2OH Ethane-1, 2-diol (Dihydric alcohol)
4. The gringard process:

A general Grignard procedure is presented for the synthesis of aliphatic, tertiary alcohols containing six to nine carbons. Without revealing the specific starting materials, students are challenged to identify their unknown products from physical (boiling points, refractive indices) and spectral (infrared O-H, C-H and fingerprint regions) data. Once a product is identified retro-synthetic considerations point to which alkyl halide and ketone were required as starting materials. This laboratory exercise in organic synthesis incorporates anhydrous techniques, distillation, and infrared analysis.

RX + Mg ---> [RMgX] + R'R"C=O ---> [RR'R"COMgX] ---> RR'R"COH

1. This process is called 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 include rice, cereal e.t.c 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.

2(C6H10O5)n + nH2O $\rightarrow $ nC12H22O11

Carbohydrate 60°C/diastase maltose

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

C12H22O11 + H2O $\rightarrow $ 2C6H12O6

Maltose 15°C/maltase glucose

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

C6H12O6 $\rightarrow $ 2CH3CH2OH + 2CO2

Glucose 15°C/Zymase Ethanol

1. Addition of H-1 : Reduction

he most common sources of the hydride Nucleophile are lithium aluminum hydride (LiAlH4) and sodium borohydride (NaBH4). Note! The hydride anion is not present during this reaction; rather, these reagents serve as a source of hydride due to the presence of a polar metal-hydrogen bond. Because aluminum is less electronegative than boron, the Al-H bond in LiAlH4 is more polar, thereby, making LiAlH4 a stronger reducing agent.

Addition of a hydride anion (H:-) to an aldehyde or ketone gives an alkoxide anion, which on protonation yields the corresponding alcohol. Aldehydes produce 1º-alcohols and ketones produce 2º-alcohols.

In metal hydrides reductions the resulting alkoxide salts are insoluble and need to be hydrolyzed (with care) before the alcohol product can be isolated. In the sodium borohydride reduction the methanol solvent system achieves this hydrolysis automatically. In the lithium aluminum hydride reduction water is usually added in a second step. The lithium, sodium, boron and aluminum end up as soluble inorganic salts at the end of either reaction. Note! LiAlH4 and NaBH4 are both capable of reducing aldehydes and ketones to the corresponding alcohol.

Example 1

