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DEPARTMENT; Medicine and Surgery

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COURSE; General Chemistry 2

 Assignment

1. Alkanols also known as alcohols are organic compounds consisting of carbon, hydrogen and oxygen. Its functional group is the –OH group. It is classified based on two facors;
2. Based on the number of –OH groups present; there are four classes based on this classification, monohydric, dihydric, trihydric and polyhydric alcohols. Monohydric alcohols contain only one hydroxyl groups in their structures. Dihydric alkanols contain two hydroxyl groups in their structures. Trihydric alcohols contain three –OH groups in their structures. And, polyhydric alcohols contain more than three –OH groups in their structure.
3. Based on the number of Hydrogen atoms attached to the –OH bearing carbon atom; according to this classification there are three classes, primary, secondary and tertiary alkanols. Primary alkanols have two or three hydroxyl groups attached to the carbon atom bearing the –OH group. Secondary alkanols have only one Hydrogen atom attached to the carbon atom bearing the –OH groups. Tertiary alkanols have no hydrogen atom attached to the –OH bearing carbon atom.

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| s/n | Classes | Examples |
| 1. | Monohydric alkanols | Methanol (CH3OH), Ethanol (C2H5OH) |
| 2. | Dihydric alkanols | Propan-1,2-diol (OHC2CH(OH)CH3), Butan-1,2-diol (OHC2CH(OH)CH2CH3) |
| 3. | Trihydric alkanols | Butan-1,2,3-triol, pentan-1,2,3-triol |
| 4. | Polyhydric alkanols | Heptan-1,2,3,4,5-pentaol, Octan-1,2,3,4-butol  |
| 5. | Primary alkanols | Butan-1-ol, propan-1-ol |
| 6. | Secondary alkanols | Butan-2-ol, propan-2-ol |
| 7. | Tertiary alkanols | Methylpropan-2-ol, 2-methyl-2-butanol |

1. Grignard Reagent; CH3CH2CH2CH2MgBr

Ketone; CH3CH2CH2CH2C=OCH2CH2CH

Step1; Grignard Reagents react with Ketone to produce an intermediate

 CH2CH2CH3

CH3CH2CH2CH2MgBr + CH3CH2CH2CH2C=OCH2CH2CH3 CH3CH2CH2CH2 C OMgBr

Grignard Reagent Ketone CH3CH2CH2CH2

Step 2; Dilute acid is added to the intermediate to form an alcohol

 CH2CH2CH3 CH2CH2CH3

CH3CH2CH2CH2 C OMgBr H2O; H+, OH- CH3CH2CH2CH2  C OH+ Mg(OH)Br

 CH3CH2CH2CH2 CH3CH2CH2CH2

1. Industrial Preparation Of Ethanols

Ethanol is produced via the natural process of fermentation of carbohydrates such as starch. The entire process of fermentation is shown in the following steps:

Step 1;

2(C6H10O5)n + nH2O Diastase; 600c n(C12H22O11)

Step 2;

n(C12H22O11) + H2O Maltase; 150c 2C6H12O6

Step 3;

C6H12O6 Zymase; 150c 2C2H5OH + CO2

1. Alkanones are reduced to secondary alcohols by reaction with hydrogen in the presence of a platinum or nickel catalyst or with a complex metal hydride like Lithium tetrahydridoaluminate (III) (LiAlH4) in ethoxyethane (C2H5)2O

Example;

CH3COCH LiAlH4/(C2H5)2O CH3CH CH

 Ketone OH

 Secondary alcohol

Alkanals are reduced to primary alcohols by the reaction with hydrogen in the presence of a platinum or nickel catalyst or with aluminum isopropoxide or with complex metal hydride like sodium tetrahydridoborate (III), (NaBH4) in water or methanol or LiAlH4 /(C2H5)2O

Example;

CH3CH2CHO LiAlH4/(C2H5)2O CH3CH2CH2OH

Aldehyde Primary Alcohol