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DEPARTMENT: PHARMACY

MATRIC NO: 19/MHS11/083

CHEMISTRY ASSIGNMENT

1. Alcohols are very important organic compounds. Discuss briefly their classification and give one example each
2. This classification is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a primary alcohol (1o). If it is one hydrogen atom, it is called secondary alcohol (2o) and if no hydrogen atom is attached the carbon atom bearing the hydroxyl group, it is called a tertiary alcohol (30).

Examples are: CH3OH Methanol (10) CH3CH (OH) CH3 Propan-2-ol (2o) (CH3) C-OH 2-Methylpropan-2ol (3o).

1. This classification is based on the 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 present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups.

 Example CH3CH2OH Ethanol Monohydric Alcohol HOCH2CH2OHethane-1-2diol

 (Dihydric alcohol) OHCH2CH (OH) CH2OH propane-1-2-3-triol

 (trihydric alcohol)

1. Discuss the solubility of alcohols in water, organic solvent
2. Solubility in water: lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with water molecules. The water solubility of alcohols decreases with increasing relative molecular mass.
3. Solubility in organic solvents: All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols and polyhydric alcohols is largely due to their ability to form hydrogen bonds with water molecules.
4. Show the three steps in the industrial manufacture of ethanol. Equations of reaction are mandatory
5. Production 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 are warmed with malt to 60oC for a specific period of time which are converted into maltose by the enzyme diastase contained in the malt.

2(C6H10O5) n + nH2O nC12H22O11

Carbohydrate 60oC/ diastase maltose

C12H22O11 + H2O 2C6H12O6

Maltose 15OC/maltose glucose

C6H12O6 2CH3CH2OH + 2CO2

Glucose 15OC/Zymase Ethanol

1. Show the reaction between 2 – methylpropanal and butylmagnesiumchloride

 C4H9

CH3CH(CH3 )CHO+ C4H9MgCl CH3CH(CH3)CH C OMgCl

 H

 C4H9 C4H9

NH4CL L

 CH3CH2 (CH2 )CH C OMgCl Mg(OH)Cl + CH3CH2 (CH2 )CH C OH

H+/OH-H

 H H

1. Show the reduction between 2 – methyl propanal

 O

CH3 C LiAlH4 CH3CH (CH3) CH20H

 CH H H20

 CH3

1. Propose a scheme for the conversion of propan – 1 – ol to propan – 2 – ol.
2. **Dehydration of propan-1-ol to propene**

Conc. H2SO4

CH3CH2CH2OH CH3CH = CH2

1. 2. Hydrolysis of propene to propan-2-ol

H2O

CH3 – CH = CH2 CH3 – CH2 – OH – CH3