**CHM102 ASSIGNMENT**

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**MATRIC NUMBER: 19/MHS01/063**

**DEPARTMENT: Pre-Medicine and Surgery**

**COLLEGE: Medicine and Health Sciences**

**LEVEL: 100**

**Assignment**

1. **ALCOHOLS ARE VERY IMPORTANT ORGANIC COMPOUNDS. DISCUSS BRIEFLY THEIR CLASSIFICATIONS AND GIVE ONE EXAMPLE EACH.**

One of the major classification of alcohols is according to the number of hydrogen atom attached to the carbon atom with the hydroxyl functional group.

1. Primary alcohols: they have two or three hydrogen atoms attached to the carbon atom of the alcohol with hydroxyl group e.g.; ETHANOL [CH3CH2OH].
2. Secondary alcohols: they have one hydrogen atom attached to the carbon atom carrying the hydroxyl functional group e.g.; PROPAN-2-OL [CH3CH(OH)CH3].
3. Tertiary alcohols: they have no hydrogen atom attached to the carbon atom carrying the hydroxyl functional group e.g.; 2-METHYLPROPAN-2-OL [(CH3)3C-OH].

One of the other major classification of alcohols is according to the number of hydroxyl group they possess.

1. Monohydric alcohols: they have one hydroxyl functional group e.g.; BUTANOL [CH3CH2CH 2CH2OH].
2. Glycols (dihydric) alcohols: they have two hydroxyl functional group e.g.; PROPANE-1,2-DIOL [HOCH2CH2CH2OH].
3. Triols (trihydric) alcohols: they have three hydroxyl functional group e.g.; PROPANE-1,2,3-TRIOL [HOCH2CH(OH)CH2OH].
4. Polyols (polyhydric) alcohols: they have more than three hydroxyl functional group e.g.; PENTAN-1,2,3,4,5-PENTAOL [CH2(OH)CH(OH)CH(OH)CH(OH)CH2(OH)].
5. **DISCUSS THE SOLUBILITY OF ALCOHOLS IN WATER, ORGANIC SOLVENTS.**

Lower alcohols with up to three carbon atoms in their molecules are soluble in water because these lower alcohols can form hydrogen bond with molecules. The water solubility of alcohols decreases with increasing relative molecular mass.

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.

1. **SHOW THE THREE STEPS IN THE INDUSTRIAL MANUFACTURE OF ETHANOL. EQUATIONS OF REACTIONS ARE MANDATORY.**

INDUSTRIAL PREPARATIONS OF ETHANOL

STEP1; starch containing materials are converted into maltose by the enzymes diastase contained in the malt.

2(C6H10O5)n + nH2O nC12H22O11

Carbohydrate 60°C/diastase maltose

STEP 2; the maltose is then broken down into glucose on addition of yeast which contains the enzymes maltase and at a temperature of 15 C.

C12H22O11 + H2O 2C6H12O6

Maltose 15°C/maltase glucose

STEP 3; the glucose is then converted into alcohol by the enzymes, Zymase contained also in yeast.

C6H12O6 2CH3CH2OH + 2CO2

Glucose 15°C/Zymase ethanol

1. **SHOW THE REACTION BETWEEN 2-METHYLPROPANAL AND BUTYLMAGNESIUMCHLORIDE. HINT; GRIGNARD SYNTHESIS.**

H H O H H H H

H – C – C – C – H **+** H – C – C – C – C – Mg – Cl

H H–C–H H H H H

H

+H2O

H H OH H H H H

H – C – C – C – C – C – C – C – H + Mg(OH)Cl

H H–C–H H H H H H

H

2- METHYLHEPTA-3-OL

1. **SHOW THE REDUCTION REACTION OF 2-METHYLPROPANAL.**

H H H H H

H

H – C C C [H⁺] H – C C C – OH

H LiAlH4/(C2H5)2O

H – C – H O H H–C–H H

H H

2-methylpropanal 2-methylpropanol

1. **PROPOSE A SCHEME FOR THE CONVERSION OF PROPANAL-1-OL TO PROPAN-2-OL.**

CH3CH2CH2OH CH3CH(OH)CH3

Propan-1-ol Propan-2-ol

STEP 1;

Add Hydrogen tetraoxosulphate(VI) H2SO4 to propan-1-ol.

CH3CH2CH2OH + H2SO4 CH3CH2CH2OH2OSO3H

STEP 2;

Dehydrate the solution product by removing water.

CH3CH2CH2OH2OSO3H CH3CH2CH2OSO3H + H2O

STEP 3;

The product is reduced and H2SO4 is removed.

CH3CH2CH2OSO3H CH3CH=CH2 + H2SO4

STEP 4;

Add water to propene.

CH3CH=CH2 + H2O CH3CH(OH)CH3

**Propan-2-ol**