Name: Marshall, Edward Otu

Department: Mechatronics Engineering

Matric Number: 19/ENG05/035

Course code: CHM 102

**Assignment for 15/05/2020**

1.) **Classification of alcohols:**

i.)a.) Primary alcohols:

They are alcohols that have the hydroxyl carrying carbon atom bound to only one other carbon atom e.g

CH3-CH2-CH2-CH2-OH

(1-Butanol)

b.) Secondary alcohols:

This class of alcohols have their hydroxy carrying carbon atom bound to two other carbon atoms.e.g

CH3-CH2-CH-CH3

OH

(2-Butanol)

c.) Tertiary alcohols:

Members of this group have their hydroxy carrying carbon atom linked to three other carbon atoms. E.g 2-Methyl-2-butanol

2.) **Solubility of alcohols:**

Lower alcohols with up to three carbon atoms in their molecular state are soluble in water due to the presence of the hydroxyl group which form hydrogen bonds with the water molecules. Alcohols with smaller hydrocarbon chains are more soluble.

All monohydric alcohols are soluble in organic solvents. The solubility of simple alcohols and polyhydric alcohols are dependent on the fact that they can form hydrogen bonds with water molecules.

3.) **Industrial preparation of ethanol;**

Carbohydrates are essential natural components that can be used to manufacture ethanol industrially through the biological process of fermentation. Enzymes found in yeast breakdown carbohydrates to give about a 95% yield of ethanol. This is done in three steps.

**Step 1:**

The starch containing materials are heated with malt to about 60 for a specific period of time and are converted to maltose by the enzyme Diastase found in malt.

2(C6H10O5)n + nH2O nC12H22O11

Carbohydrate 60 / Diastase maltose

**Step 2:**

The maltose is broken down into Glucose at a temperature of 15 by the enzyme maltase.

C12H2202 + H20 2C6H1206

Maltose 15 / maltase Glucose

**Step3:**

At a constant temperature of 15 is then converted to ethanol by an enzyme, zymase found in yeast.

C6H1206 2CH3CH2OH + 2CO2

Glucose 15 / Zymase Ethanol

4.) **Reaction between 2-methyl propanal and Butylmagnesiumchloride**

CH3CH(CH3)

CH3CH(CH3)CHO + CH3CH2CH2CH2MgCl CH3CH2CH2CH2-C-O-MgCl

H

CH3CH(CH3) CH3CH(CH3)

CH3CH2CH2CH2-C-O-MgCl + H20 CH3CH2CH2CH2-C-OH + Mg(OH)Cl

H H

5.) **Reaction between 2-Methypropanone and Butylmagnesiumchloride**

CH2(CH3)

CH2(CH3)COCH3 + CH3CH2CH2CH2MgCl CH3CH2CH2CH2-C-O-MgCl

CH3

Addition of dilute acid

CH2(CH3) CH2(CH3)

CH3CH2CH2CH2-C-O-MgCl + H2O CH3CH2CH2CH2-C-OH + Mg(OH)Cl

CH3 CH3

6.) **Reduction of 2 methyl propanone using LiAlH4 (Lithiumtetrahydrydoaluminate (IV))**

OH

2CH2(CH3)COCH3 + 4[H] 2CH2(CH3)-C-H (1-methyl propan-2-ol)

CH3

7.) **Reduction of 2-methylpropanal by LiAl4**

LiAl4

CH3CH(CH3)CHO + 4[H] H(CH3)(CH3)C-C(OH)H2

(1,1-dimethylpropan-2-ol)

8.) Heat the propan-1-ol in the presence of concentrated tetraoxosulphate(IV) acid in order to dehydrate it and form propene. Then add water in the presence of mercurial acetate (in order to favour Markownikoff addition) after heating.