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**COURSE CODE: CHEM 102**

**ASSIGNMENT**

1. **Classification of Alkanols**

* **Based On The Number Of Hydrogen Atoms Attached To The Carbon Atoms Containing The Hydroxyl Group: if the number of hydrogen atoms attached to the carbon atoms containing the hydroxyl group are three or two, it is called a Primary Alkanol. If it only one hydrogen atom, it is called Secondary Alkanol. And if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is then called a Tertiary Alkanol.**

**Example:**

**CH3CH2OH – Ethanol – Primary Alkanol**

* **Based On The Number Of Hydroxyl Groups They Possess In Their Structures: Alkanols with only one Hydroxyl group ( OH- ) present in their structure is said to be Monohydric Alkanols. While those with two hydroxyl groups attached in their structure is known to be Dihydric Alkanol or Glycols. Trihydric Alkanols or triol have three hydroxyl groups present in their structure while polyol or Polyhydric Alkanols are those with more than three hydroxyl groups in their alkanol structure.**

**Example:**

**HOCH2CH2OH - Ethan-1,2-diol : Dihydric Alkanol**

1. **Industrial manufacture of ethanol**

**Carbohydrates such as starch are major group of natural compounds that can be made to yield ethanol by biological process of Fermentation. The biological catalysts, enzymes found in the yeast breakdown the carbohydrates into ethanol to give a yield of 95%**

**Step1: The starch containing materials include molasses, potatoes, rice, etc on warming with malt to 60°c for a specific period of time are converted into maltose by the enzyme diatase contained in the malt.**

**2(C6H10O5)n + nH2O --> nC12H22O11**

**Step2: The Maltose is the broken into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°c**

**C12H22O11 + H2O --> 2C6H12O6**

**Step3: The glucose at constant temperature of 15% is then converted into alkanol by the enzyme zymase contained also in yeast.**

**C**6**H12O6 --> 2CH3CH2OH + 2CO2**

**Ethanol: CH3CH2OH**

1. **Solubility Of Alkanols In**

**Water : Lower Alkanols with up to three carbon atoms in their molecules are soluble in water because these lower Alkanols can form hydrogen bond with water molecules. The water solubility of Alkanols decreases with increasing relative molecular mass. The solubility of simple Alkanols and Polyhydric Alkanols is largely due to its ability to form hydrogen bonds with water molecules.**

* **Organic Solvents: All Monohydric Alkanols are soluble in organic solvents. Therefore the solubility of Alkanols decreases with increasing relative molecular mass.**

1. **The reaction between 2-methylpropanal and butylmagnesiunchloride**

* **CH3CH(CH3)CH3 + CH3(CH2)2CH3MgCl -------> CH3CH(CH3)CH3H--C=O + CH3(CH2)2CH3MgCl**
* **CH3CH(CH3)**CH**3H – C = O + CH3CH(CH3)CH3MgCl ---> CH3CH(CH3)CH3HCH3(CH2)2CH3-C—OMgCl**
* **CH3CH(CH3)CH3 -H-CH3(CH2)2CH3 – C – OMgCl ---NH4CL—H+---OH- ----> CH3HCH(CH3)CH3-H-CH3(CH2)2CH3-C-OH + Mg(OH)Cl**

1. **Reduction reaction of 2-methylpropanal**

**CH2C(CH3)2HCHO ----LiAlH4 ( C2H5)2O ---> CH2C(CH3)2H2CH2OH**

1. **Conversion of propan-1-ol to propan-2-ol**

**Propan-1-ol - CH3CH2CH2OH**

**Step 1: Dehydrate the alkanol**

**CH3CH2CH2OH + H2SO4 ---> CH3CH2CH2OH2OSO3H**

**Minus: H2O**

**CH3CH2CH2OSO3H**

**Minus : H+ OSO3H-**

**---> CH3CH=CH - alkene**

**Step 2: Hydrate the alkene**

**CH3CH=CH**

**ADD H+ OH-**

**CH3CHOHCH2 – Propan-2-ol**