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**DEPARTMENT: MBBS**

**MATRIC NUMBER: 19/MHS01/080**

**COURSE CODE: CHM 102**

1. **Discuss the two major classification of Alkanols. Give two examples each for each class**

**ANSWER:** The two major classifications of alkanols are;

1. **The classification based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group.**

There are 3 divisions under this classification.If the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are two or three, then it is called a **PRIMARY ALCOHOL.** If it has only one hydrogen atom attached, then it is called a **SECONDARY ALCOHOL.** If there is no hydrogen atom attached to the carbon atom bearing the hydroxyl group, then it is called a **TERTIARY ALCOHOL.**

**E. G.**

**I.)** (CH3)3C-OH {2-methyl propan-2-ol}. This is a typical example of a tertiary alcohol.

**ii.)** CH3CH2CH2CH(OH)CH3 {Pentan-2-ol}. This is a typical example of a secondary alcohol.

1. **The classification based on the number of hydroxyl groups they possess.**

There are also four divisions under this classification. They are the **monohydric, the dihydric(GLYCOLS), the trihydric(TRIOLS) and the polyhydric(POLYOLS). The monohydric alcohol** has only one hydroxyl group present in the alcohol structure. **The dihydric alcohol** has two hydroxyl groups present in the alcohol. **The trihydric alcohol** has three hydroxyl groups present in the alcohol structure. Lastly is **the polyhydric alcohol** which has more than three hydroxyl groups.

**E. G.**

**I.)** CH2(OH)CH(OH)CH(OH)CH2CH3 [Pentane-1,2,3-triol]. This is a typical example of the trihydric alcohol.

**ii.)** CH3CH(OH)CH(OH)CH(OH)CH(OH)CH3 [Hexane-2,3,4,5-butaol]. This is a typical example of the polyhydric alcohol.

1. **In the Grignard synthesis of alkanols, react a named Grignard reagent with CH3CH2CH2CH2C=OCH2CH2CH3. Show the reaction steps.**

**ANSWER**

Let the Grignard reagent be CH3MgBr (Methyl Magnesium Bromide).

**CH3**

**|**

**CH3CH2CH2CH2C=OCH2CH2CH3 + CH3MgBr ----------------> CH3CH2CH2CH2-C-OMgBr**

**|**

**CH3 CH2CH2CH3**

**H+ OH- |**

**------------> CH3CH2CH2CH2-C-OH + Mg (OH)Br**

**|**

**CH2CH2CH3**

1. **Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of reaction.**

**ANSWER**

The industrial production of ethanol involves the fermentation of carbohydrate. There are three steps involved in the fermentation.

STEP 1: The material (molasses, potato, cereals, rice, etc.) which contains starch are heated with malt to **60 degrees** for a specific period of time and they are converted into maltose by the enzyme **DIASTASE** contained in the malt.

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

STEP 2: The maltose is broken down into glucose on addition of yeast which contains the enzyme **MALTASE** and at a temperature of **15 degrees**.

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

STEP 3: The glucose at a constant temperature of **15 degrees** is then converted into alcohol by the enzyme **ZYMASE** contained also in the yeast.

**C6H1206 ------------------> 2CH3CH2OH + 2CO2**

1. **Determine the product obtained in the reduction of alkenone and alkanal. Use a specific example for each and show the equation of each reaction.**

**ANSWER**

In the reduction of alkenone, the product obtained is **SECONDARY ALCOHOL.**

**E. G. H2O/LiAlH4**

**CH3COCH2CH2CH2CH3 -----------------> CH3CH(OH)CH2CH2CH2CH3**

Hexan-2-one Hexan-2-ol

In the reduction of alkanal, the product obtained is a **PRIMARY ALCOHOL.**

**E. G. H2O/LiAlH4**

**CH3CH2CH2CHO ---------------------> CH3CH2CH2CH2OH**

Butanal Butanol