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DEPARTMENT: NURSING

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**QUESTIONS**

1. Discuss the two major classifications of alkanols. Give two examples each for each class.

*ANSWER*

THEY INCLUDE;

* **Based on the number of hydrogen atom attached to the carbon atom containing the** **hydroxyl group**: Under this classification, the alkanol that consist of two or three hydrogen atoms attached to the carbon atom and the hydroxyl group is called PRIMARY ALKANOLS. When it has only hydrogen atom it is known as SECONDARY ALKANOLS. When it has no hydrogen atom attached to the carbon atom it is called TERTIARY ALKANOLS. Their examples includes respectively;

A] CH₃OH {METHANOL} and CH₃CH₂OH {ETHANOL}

B] CH₃CH[OH]CH₃ {PROPAN-2-OL} and CH₃CH[OH]CH₂CH₃ {BUTAN-2-OL}

C] CH₃C[CH₃][OH]CH₃ {2-METHYL PROPAN-2-OL} and CH₃C[CH₃][OH]CH₂CH₃ {2-METHYL BUTAN-2-OL}

* **Based on the number of hydroxyl groups:** An alkanol with one hydroxyl group is called a **MONOHYDRIC ALKANOL. EXAMPLE: CH₃CH₂CH[OH] PROPANOL and CH₃CH[OH] ETHANOL.** ALKANOLS with two hydroxyl groups are **called DIHYDRIC ALKANOLS or** **GLYCOLS**. **EXAMPLE: CH₂[OH]CH₂[OH] ETHAN-1,2-DIOL and CH₃CH[OH]CH[OH]CH₃ BUTAN-2,3-DIOL.** ALKANOLS with three hydroxyl groups are called **TRIHYDRIC ALKANOLS OR TRIOL. EXAMPLE: CH₂[OH]CH[OH]CH₂[OH] PROPAN-1,2,3-TRIOL and CH₂[OH]CH[OH]CH[OH]CH₃ BUTAN-1,2,3-TRIOL.** ALKANOLS that contains more than three hydroxyl groups are called **POLYHYDRICS**.
1. In the Grignard synthesis of alkanols, react a named Grignard reagent with CH₃CH₂CH₂CH₂C=O-CH₂CH₂CH₃. Show the reaction steps.

*ANSWER*

CH₃MgBr + CH₃CH₂CH₂CH₂C=O-CH₂CH₂CH₃ → CH₃CH₂CH₂CH₂C[CH₃][OH]CH₂CH₃ + Mg[Br]Cl

{Grignard Reagent} {OCT-4-ENE} {Tertiary alkanol}

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

*ANSWER*

The industrial process in producing ethanol includes:

* The starch containing material such as rice is converted to maltose by an enzyme diastase in malt which is warmed at a specific period of time at 60◦C.

2[C₆H₁₀O₆]n + nH₂O 60◦C nC₁₂H₂₂O₁₁

{Carbohydrate} Diastase {Maltose}

* Maltose is broken down with maltase enzyme at 15◦C to give glucose.

C₁₂H₂₂O₁₁ + H₂O Maltase/ 15◦C 2[C₆H₁₂O₆]

{Maltose} {Glucose}

* Finally glucose at constant temperature 15◦C with the enzyme zymase contained in yeast is then converted to ethanol.

2[C₆H₁₂O₆] Zymase/15◦C 2CH₃CH₂OH + 2CO₂

1. Determine the product obtained in the reduction of Alkanone and Alkanal. Use a specific example for each and show the equation reaction.

*ANSWER*

**ALKANONE**: 2[CH₃]C=O CH₃CH[OH]CH₃

 **{Propanone} {Propan-2-ol}**

**REDUCTION OF PROPANONE TO PROPAN-2-OL**

**ALKANALS:** CH₃C=OH +2[H] CH₃CH₂OH

 **{Ethanal} {Ethanol}**

**REDUCTION OF ETHANAL TO ETHANOL**