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DEPARTMENT: PHARMACY

MATRICULATION NO: 19/MHS11/049

COURSE CODE: CHEM 102

### ANSWERS TO ASSIGNMENT

1. Discuss the two major classification of alkanol. Give two examples each for each classes

Answer

a. Based On The Number Of Hydrogen Atoms ; attached to the hydroxyl group. If the number of hydrogen atoms attached to the hydroxyl group is three or two; it is therefore a Primary Alkanol. If the number of hydrogen atom attached to the hydroxyl group is one; then it is therefore a Secondary Alkanol but if there are no hydrogen atoms attached to the hydroxyl group, it is then a Tertiary Alkanol.

Examples;

$\text{CH}_3\text{CH}_2\text{OH}$  - Ethanol - Primary Alkanol ( $1^\circ$ )

$\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$  - Propan-2-ol - Secondary Alkanol ( $2^\circ$ )

b. Based on The Number Of Hydroxyl or Hydroxide group they posses In Their Structures: Alkanols with only one OH- present in its structure is said to be Monohydric. Those with two hydroxyl group attached to its structure are known to be Dihydric or called Glycol's. Trihydric or triol are those with three OH- in their structure while Polyhydric or polyol are those possessing more than three hdroxyl group in their structures.

Examples;

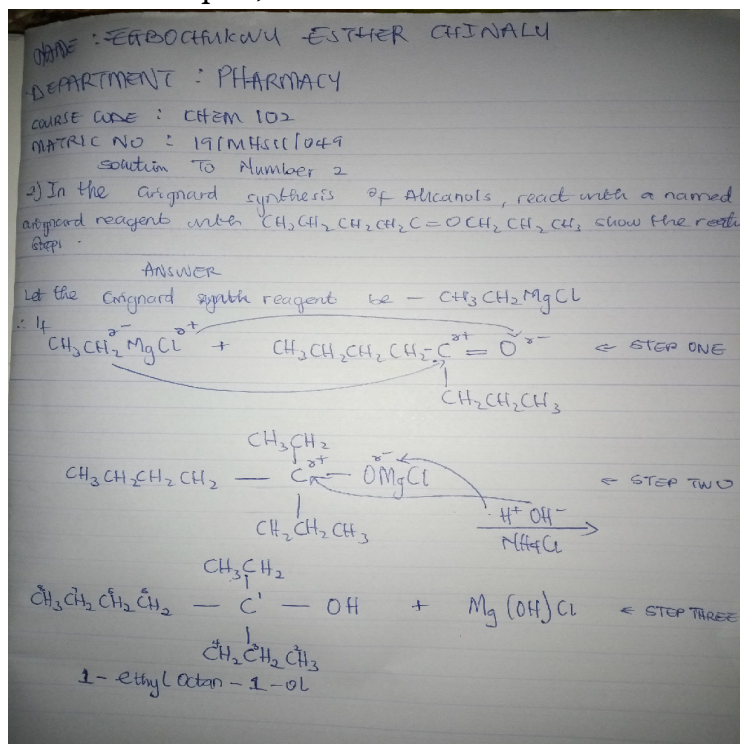
$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$  - Propan-1-ol or Propanol - Monohydric

$\text{HOCH}_2\text{CH}_2\text{OH}$  - Ethan-1,2-diol - Dihydric or Diol

2. In the Grignard synthesis of Alkanols, react with a named Grignard reagent with  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$  show the reaction steps

Answers

Let the Grignard reagent be -  $\text{CH}_3\text{CH}_2\text{MgCl}$

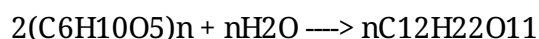


3. Discuss the industrial manufacture of ethanol showing all reaction equations and necessary enzymes and temperature of the reaction

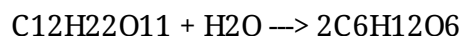
Answer

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

The starch containing materials include molasses, potatoes, rice and on warming with malt to 60°C for a specific period of time are converted into maltose by the enzyme diastase contained in the malt



The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C



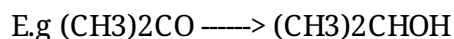
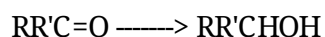
The glucose at constant temperature of 15°C is then converted into alcohol / alkanol by the enzyme zymase contained also in yeast.



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

Answer

Reduction of an Alkanone to give a Secondary Alkanol (2°), Using a reducing agent such as Lithiumtetrahydridoaluminate(III)  $LiAlH_4$  in ethoxyethane  $(C_2H_5)_2O$



Reduction of an Alkanal to give primary Alkanol, Using a reducing agent Lithiumtetrahydridoborate(III)  $LiBH_4$  in ethoxyethane  $(C_2H_5)_2O$

