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DEPARTMENT: PHARMACY

MATRIC NO: 19/MHS11/083

CHEMISTRY ASSINGMENT

1. Discuss the two major classification of Alkanols. Give two examples each for each class
2. This classification is based on the number of hydrogen atoms attached to the carbon atom containing the hydroxyl group. If the numbers of hydrogen atoms attached to the carbon atom bearing the hydroxyl group are three or two, it is called a primary alcohol (1o). If it is one hydrogen atom, it is called secondary alcohol (2o) and if no hydrogen atom is attached the carbon atom bearing the hydroxyl group, it is called a tertiary alcohol (30).

Examples are: CH3OH Methanol (10) CH3CH (OH) CH3 Propan-2-ol (2o) (CH3)C-OH 2-Methylpropan-2ol (3o).

1. This classification is based on the number of hydroxyl groups they possess. Monohydric alcohols have one hydroxyl group present in the alcohol structure. Dihydric alcohols are also called glycols have two hydroxyl groups present in the alcohol structure while trihydric alcohols or triols have three hydroxyl groups present in the structure of the alcohol. Polyhydric alcohols or polyols have more than three hydroxyl groups.

Example CH3CH2OH Ethanol Monohydric Alcohol HOCH2CH2OHethane-1-2diol (Dihydric alcohol) OHCH2CH (OH) CH2OH propane-1-2-3-triol (trihydric alcohol).

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

Name of the grinard reagent being used:

 CH3CH2

CH3CH2CH2CH2C=OCH2CH2CH3 + CH3CH2MgCl CH3CH2CH2CH2 C OMgCl

 CH2CH2CH3

 CH3CH2 CH3CH2

NH4CLL

 CH3CH2CH2CH2 C OMgCl Mg(OH)Cl + CH3CH2CH2CH2 C OH

H+/OH-H

 CH2CH2CH3  CH2CH2CH3

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

Production Ethanol

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 yeast break down the carbohydrate molecules into ethanol to give a yield of 95%. The starch containing materials are warmed with malt to 60oC for a specific period of time which are converted into maltose by the enzyme diastase contained in the malt.

2(C6H10O5)n  + nH2O nC12H22O11

Carbohydrate 60oC/ diastase maltose

C12H22O11 + H2O 2C6H12O6

Maltose 15OC/maltose glucose

C6H12O6 2CH3CH2OH + 2CO2

Glucose 15OC/Zymase Ethanol

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

 Reduction of alkanal

This is the reduction of alkanal by reaction with hydrogen in the presence of a complex metal hydride such as lithium tetrahydridoaluminate (III) (LiAlH4)

The reduction of propanal to give propanol which is a primary alcohol.

 O

CH3CH2C LiAlH4 CH3CH2CH20H

 H H20

 Alkanal Primary alcohol

 Reduction of Alkanone

Wolff- Kishner reduction

 This is the reduction of alkanone to the appropriate hydrocarbon can be achieved by heating the carbonyl compound with hydrazine in the presence of alkali.

 O

C6H6 C + H2NH2 KOH, 1500C C6H6 CH2CH2CH2

 C2H5  ethanediol