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MATRIC NO.: 19/MHS11/021

COURSE: CHEMISTRY (CHM 102)

Assignment

1. Alcohols are very important organic compounds. Discuss briefly their classification and give one example each.

Alcohols can be classified according to their number of alkyl group surrounding the functional groups which are;

Primary alcohols- 2 or 3 hydrogen atoms attached to carbon bearing the hydroxyl group e.g. methanol

Secondary alcohols- 1 hydrogen atoms attached to carbon bearing the hydroxyl group e.g. propan-2-ol

 Tertiary alcohols- no hydrogen atoms attached to carbon bearing the hydroxyl group e.g. MethylPropan-2-ol

 Or according to the number of hydroxyl group in a compound which are;

Monohydric alcohols- 1 hydroxyl group present e.g. propanol

Dihydric alcohols- 2 hydroxyl groups present also known as glycol e.g. ethan-1,2-diol

Polyhydric alcohols- more than 2 hydroxyl groups present. Also known as polyol e.g. propan-1,2,3-triol

1. Discuss the solubility of alcohols in water, organic solvents

Polar dissolves polar and non polar dissolves non polar but the case is different for alcohols. They are soluble in water due to the hydroxyl group present via strong hydrogen bond. Their solubility decreases with increasing alkyl groups. All monohydric alcohols are soluble in organic solvents.

1. Show the three steps in the industrial manufacture of ethanol. Equations of reaction are mandatory

i. Hydrolysis of starch

Starch is hydrolyzed to maltose by an enzyme called diastase

2(C6H10O5) + nH2O $→$ n (C12H22O11) 1st step

Starch 60$℃$ Maltose

ii. Fermentation

Finally, yeast is added to maltose

C12H22O11 + H2O $→$ 2C6H12O6  2nd step

 Maltose 15$℃$ glucose

C6H12O6 $→$ C2H5OH + 2CO2 3rd step

 Glucose 15$℃$ ethanol

1. Show the reaction between 2-methylpropanal and butylmagnesiumchloride  Hint: Grignard synthesis



 5. Show the reduction reaction of 2-methylpropanal

The product of reduction of aldehyde is primary alcohol by usual reducing agent such as lithiumtetrahydridoaluminate(iii) in ethoxyethane

 (CH3)2CHCHO + 2[H] $→$ (CH3)2CHCH2OH

6. Propose a scheme for the conversion of propan-1-ol to propan-2-ol.

Propan-1-ol is dehydrated to propene which is then hydrolysed following markonikoff’s rule

 