CHM 102

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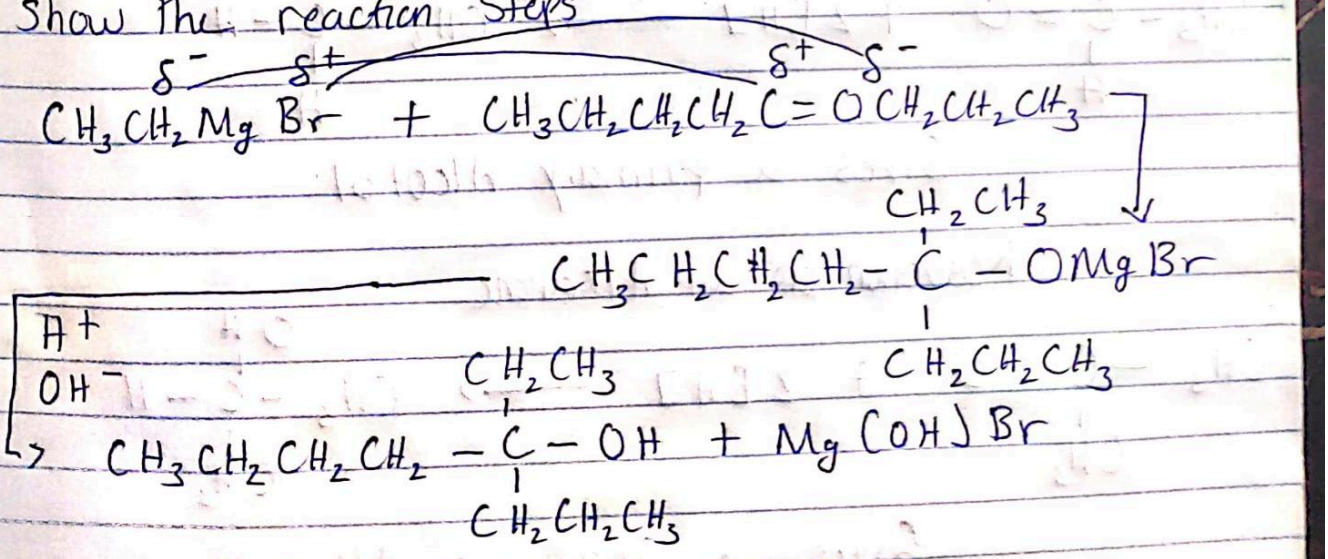
19/MHS01/172

(1) Discuss the two major characteristics ~~of~~ OF Alkanols. Give two examples each of each class.

- Based on the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl group. Divided into primary, secondary and tertiary.
  Ex. Methanol – CH_3OH
  Ethanol – CH_3CH_2OH

- Based on the number of hydroxyl groups Alkanols possess. Divided into monohydric, Dihydric & polyhydric.
  Ex. $OHCH_2CH_2CH_2OH$ – propan-1,3-diol
  $OHCH_2CH_2CHOHCH_2CH_2CH_2OH$ – Hexan-1,3-6-triol

(2) In the Grignard Synthesis of Alkanols, react a named Grignard reagent with $CH_3CH_2CH_2CH_2C=OCH_2CH_2CH_3$ Show the reaction steps



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

1: By Breaking down of carbohydrates to disaccharide

$$2(C_6H_{12}O_5)_n + nH_2O \xrightarrow[60^\circ C]{\text{Diastase}} n\,C_{12}H_{22}O_{11}$$

2: Maltose is broken down in water to give glucose

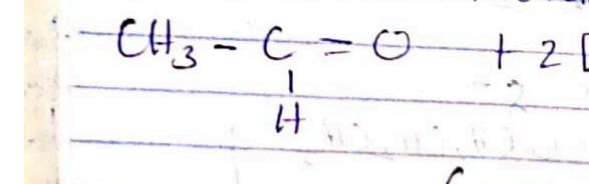
$$C_{12}H_{22}O_{11} + H_2O \xrightarrow[15^\circ C]{\text{maltase}} C_6H_{12}O_6$$

3: Conversion of glucose to ethanol

$$C_6H_{12}O_6 \xrightarrow[15^\circ C]{\text{Zymase}} C_2H_5OH + 2CO_{2(g)}$$

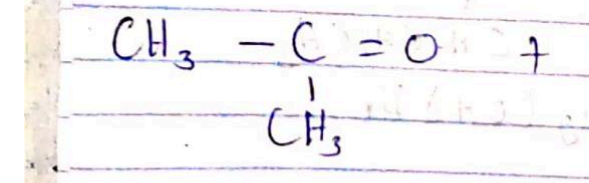
(4) Determine the product obtained in the reduction of Alkanone and Alkanal. Use a specific Example for each and show the Equation of reaction.

Reduction of an Alkanal



Gives a primary Alcohol

Reduction of an Alkanone



Gives a Secondary Alcohol