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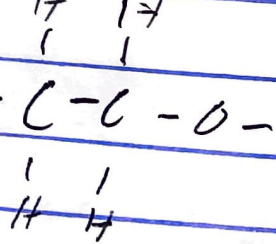
Dept. : MBBS
Course : CHM 102

Answers

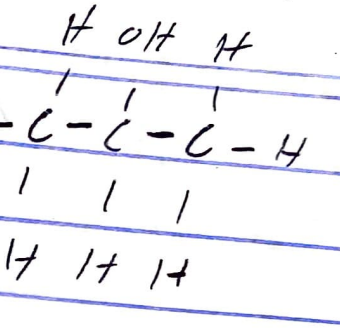
1.) a.) Classification based on the number of hydrogen atoms attached to the carbon atom bearing the hydroxyl ~~are~~ group are three or two, it is called a "primary alkanol" (1°) [in a primary alkanol, the hydroxyl group is attached to a primary or terminal atom in the molecule, it is characterised by $[H_2OH]$. If it is one hydrogen atom ~~attached~~ attached to the carbon atom bearing the hydroxy group, it is called "secondary alkanol" [in a secondary alkanol, the -OH group is on a secondary carbon atom; it is characterised by $>[HOH]$ and if no hydrogen atom is attached to the carbon atom bearing the hydroxyl group, it is called a "tertiary alkanol" [in a tertiary alkanol, the -OH is on a tertiary carbon. It is characterised by $>C-OH$]

Examples

i.) CH_3CH_2OH - Ethanol (1°) ⇒



ii.) $CH_3CH(OH)CH_3$ - Propan-2-ol $\Rightarrow$



b.) Classification based on the number of hydroxyl group they posses: Monohydric alkanols have only one hydroxyl groups per molecule present in the alkanol structure. Dihydric alkanols also called glycols have two hydroxyl groups present in the alkanol structure while trihydric ~~of~~ alkanols or triols have three hydroxyl groups present in the structure of the alkanol. Polyhydric alcohols or polyols have more than three ~~hydroxyl~~ hydroxyl groups.

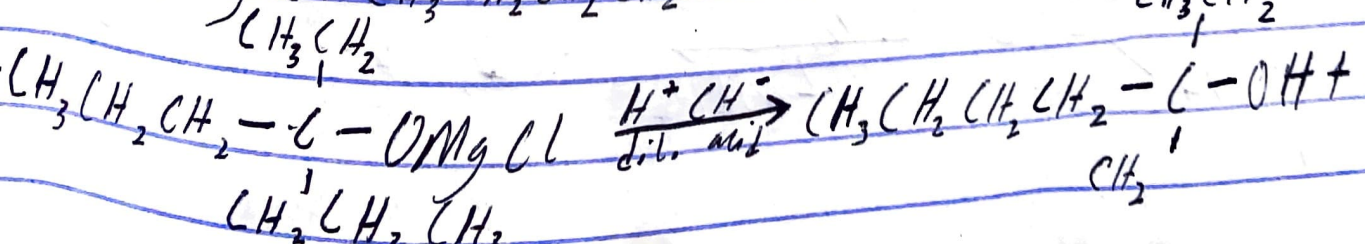
Examples.

i.) $CH_3CH_2CH_2OH$ - Propanol (Monohydric alkanol)

ii.) $CH_3CH(OH)CH_2CH(OH)CH_2CH_3$ - Hexane-2,4-diol (Dihydric alkanol)

2.) Grignard reagent: CH_3CH_2MgCl (ethyl magnesium chloride)

$CH_3CH_2MgCl + CH_3CH_2CH_2CH_2C{=}OCH_2CH_2CH_3 \longrightarrow$



3.) Industrial Manufacture of Ethanol:

Carbohydrates such as Starch are major gr... 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%.

Step 1 - The starch Containing materials include molasses potatoes, Cereals, rice and on warming with malt they are converted to maltose by the enzyme diastase.

$$2(C_6H_{10}O_5)_n + nH_2O \xrightarrow[\text{diastase}]{60°C} nC_{12}H_{22}O_{11}$$

Carbohydrate → maltose

Step 2 - $C_{12}H_{22}O_{11}$ (maltose) $+ H_2O \xrightarrow[\text{maltase}]{15°C} 2C_6H_{12}O_6$ (glucose)

Step 3 - $C_6H_{12}O_6$ (glucose) $\xrightarrow[\text{zymase}]{15°C} 2CH_3CH_2OH + 2CO_2$

ethanol, Carbon (IV) oxide

4.) The reduction of Alkanone and Alkanal Using Meerwein - Ponndorf rxn

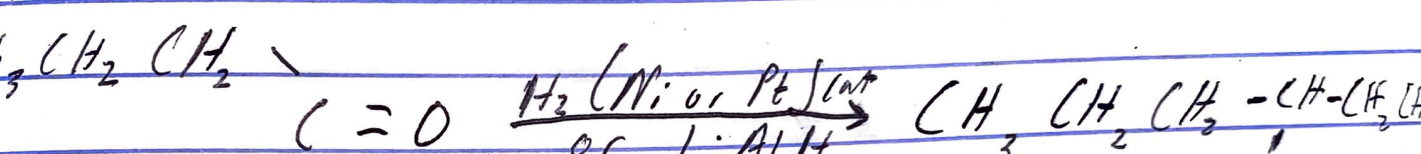
- Alkanal

$$CH_3CH_2CH_2(H)C=O \xrightarrow[\text{or } LiAlH_4]{H_2(Ni: or\ Pt)\ cat} CH_3CH_2CH_2CH_2OH$$

Butanal → Butanol

The ~~rest~~ reaction above shows the reduction of an alkanal (butanal) to alkanol (butanol)

- Alkanone



Hexan-3-one

Hexan-3-ol

reduction of alkanone to alkanol.