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MATRIC NO  $\rightarrow$  19/MTH/11/003

CHEM 102 Assignment

1 Alkanols can be classified based on;

① Based on the kind of carbon that bears the  $-OH$  group.

$\Rightarrow$  Primary Alkanols: These are alkanols that have the  $-OH$  group attached to the primary carbon, the primary carbon is a saturated carbon atom which has either 3 hydrogen atoms attached to it or only 1 alkyl group and 2 hydrogen atoms attached to it examples are

\* Methanol ( $C_1H_3O_1$ )

$\Rightarrow$  Secondary Alkanols: These are alkanols that have the  $-OH$  group attached to a saturated carbon atom which has 2 other alkyl groups (R) attached to it e.g., Propan-2-ol ( $C_3H_7O_1$ )

$\Rightarrow$  Tertiary Alkanols: These are alkanols that have the  $-OH$  group attached to a saturated carbon atom which has 3 other alkyl groups attached to it e.g., 2-methylpropan-2-ol [ $C(CH_3)_3COH$ ] = ( $C_4H_{10}O$ )

② Based on the number of  $-OH$  group.

$\Rightarrow$  Monohydric alkanols  $\rightarrow$  These are alkanols that contains one hydroxyl ( $C-OH$ ) group, e.g. \* Ethanol ( $C_2H_5OH$ )

$\Rightarrow$  Dihydric alkanols  $\rightarrow$  These are alkanols that contains 2 hydroxyl groups ( $C-OH$ ). They are also known as glycols e.g. \* 1,2-ethanediol ( $C_2H_6O_2$ )

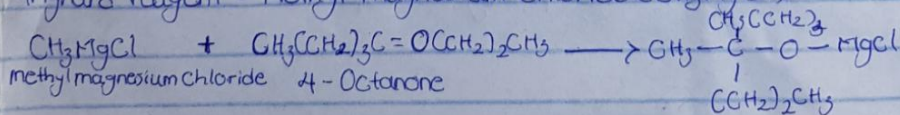
$\Rightarrow$  Trihydric alkanols  $\rightarrow$  These are alkanols that contain 3 hydroxyl groups ( $C-OH$ )

\* 1,2,3-Propanetriol (Glycerol) ( $C_3H_8O_3$ )

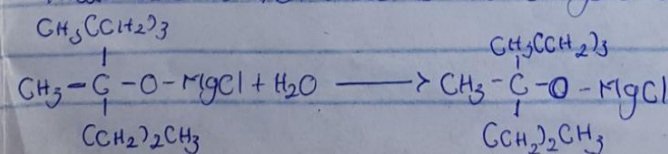
$\Rightarrow$  Polyhydric alkanols  $\rightarrow$  These are alkanols with 4 or more hydroxyl groups, they are also known as sugar alcohols e.g. \* Sorbitol ( $C_6H_{14}O_6$ )

2  $CH_3CH_2CH_2CH_2C=OCH_2CH_2CH_3$  Condensed to  $CH_3(CCH_2)_3C=O(CCH_2)_2CH_3$ , reacts with a named Grignard reagent.

Grignard reagent = Methyl magnesium chloride ( $CH_3MgCl$ )

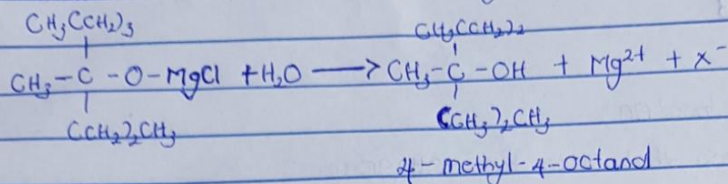


$\Rightarrow$  Dilute acid is then added to this to hydrolyse it.



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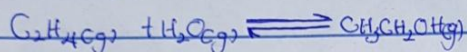
⇒ Dilute acid is then added to hydrolyse it



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Ethene (Ethylene) hydration

Ethanol is manufactured by reacting ethene with steam. The reaction is reversible, and the formation of ethanol is exothermic.



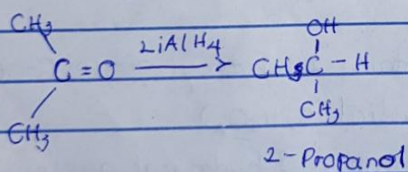
The reaction needs 1 vol. of ethene and 0.6 vol. of steam at a temperature of 300°C, a pressure of 60-70 atm and phosphoric(V) acid as a catalyst.

Only 5% of the ethene gas is converted into ethanol (by cooling) and recycling the ethene, it is possible to achieve 95% conversion.

4: Reduction of Alkanones

Used example: 2-Propanone

Reducing agent: Lithium tetrahydroaluminate(III) (LiAlH<sub>4</sub>)

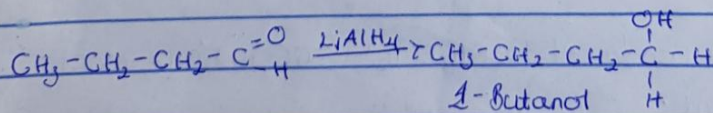


The reduction of Alkanones results in the production of secondary alkanols

ii Reduction of Alkanals

Used examples: butanal

Reducing agent: Lithium tetrahydroaluminate(III) (LiAlH<sub>4</sub>)



The reduction of alkanals produces primary alkanol.