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Matric No: 19/ENGO4/012

Course Code: CITEM 102

Assignment:

① Discuss the two major classification of Alkanols. Give two examples each for each class.

Ans:

* Classification of Alkanols

① This is based on the number of hydrogen atom 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 (1°). If it is one hydrogen atom, it is called a secondary alcohol (2°) and if no hydrogen atom is attached to the Carbon atom bearing the hydroxyl group it is called a tertiary alcohol (3°)

examples: ① CH_3OH - methanol (1°)

② $(\text{CH}_3)_3\text{C-OH}$ - 2-Methylpropan-2-ol (3°)

② This 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 2(hydroxyl) hydroxyl groups present in the alcohol structure.

- 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.

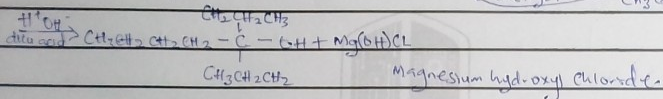
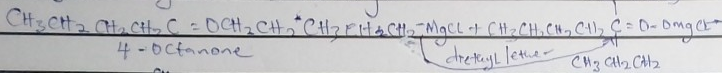
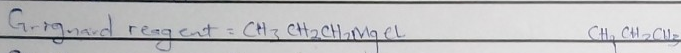
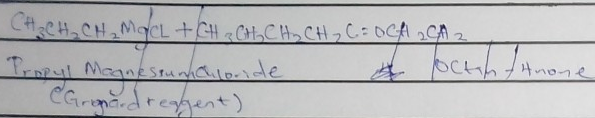
e.g ① $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (propanol) (monohydric alcohol)

② $\text{CH}_2\text{OH-CH(OH)-CH}_2\text{OH}$ propane 1,2,3 triol (Tri-hydric alcohol)

②

* In the Grignard Synthesis of Alkanols, react a named Grignard reagent with " $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}=\text{OCH}_2\text{CH}_2\text{CH}_3$ ". Show the reaction steps.

Soln



4-Propyloctan-4-ol

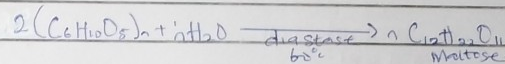
③

Discuss the industrial manufacture of ethanol showing all reactions equations and necessary enzymes and temperature directions.

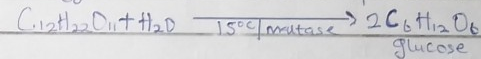
Answer:

* 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%.

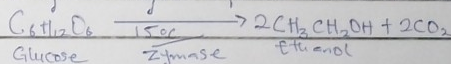
The starch containing materials include molasses, potatoes, cereals, rice and on warming with malt to 60°C for a specific period of time, are converted into maltose by the enzyme diastase contained in the malt.



The maltose is broken down into glucose on addition of yeast which contains the enzyme maltase and at a temperature of 15°C



The glucose at constant temperature of 15°C is then converted into alcohol by the enzyme Zymase contained also in yeast



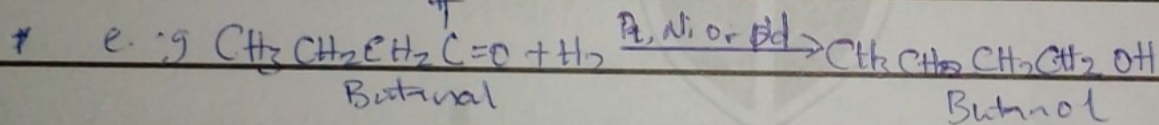
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① Determine the product obtained in the reduction of Alkane and Alkanol. Use a specific example for each and show the equation of the reaction.

Answer

* Aldehydes and ketones are reduced to primary and secondary alcohols respectively by reaction with hydrogen in the presence of a Platinum or nickel catalyst or with aluminium isopropoxide (the Meerwein-Ponndorf reaction) or with complex metal hydrides such as lithium tetrahydridoaluminate (III) (LiAlH_4) or sodium tetrahydridoborate (III) (NaBH_4).

Examples. Reduction of an alkanol yield an alkanol



∴ Reduction of an alkanone yield a secondary alkanol

