

PRODUCTION OF ALCOHOL FROM SUGARCANE

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Introduction –

- ▶ Commonly called alcohol, ethyl alcohol, drinking alcohol.
- ▶ It is a neurotoxic, psychoactive drug, and one of the oldest recreational drugs.
- ▶ Ethanol is a volatile, flammable, colorless liquid with a slight chemical odor.
- ▶ Empirical formula is C_2H_5OH



Ethanol Production From Sugarcane(1)

- ▶ The cane is cut and milled with water. This produces a juice with 10-15% solids from which the sucrose is extracted. This juice contains undesired compounds which causes sugar inversion (hydrolysis of sugar into fructose or glucose). This needs clarification step in order to prevent sugar inversion.
- ▶ In this clarification step, the juice is heated to 115°C and treated with lime and sulfuric acid, which precipitates unwanted organics.
- ▶ The next step for ethanol production is the fermentation step, where juice and molasses are mixed so that a 10-20% sucrose solution is obtained. The fermentation is exothermic therefore, cooling is needed to keep the reactions under fermentation conditions.



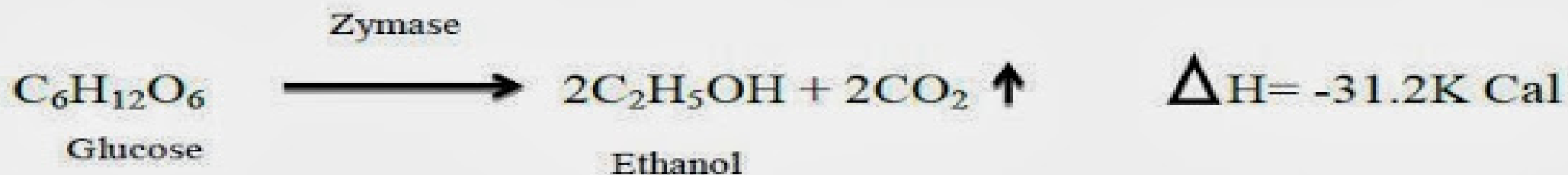
Ethanol production from sugarcane (2)

Yeast is added along with the nutrients (nitrogen and trace elements) to keep yeast growing. Fermentation can take place in both batch and continuous reactors.

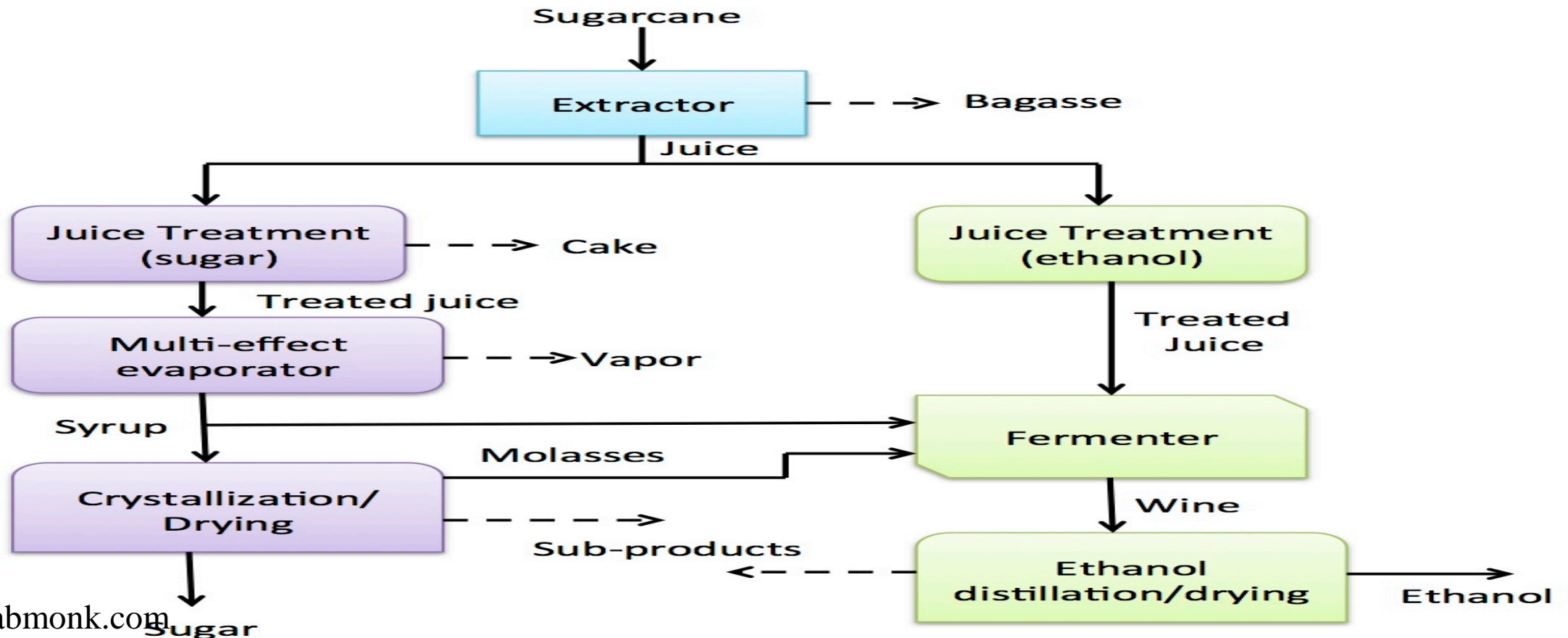
Rum, Tequila and Mescal vodka are the alcoholic byproducts of sugarcane.



Chemical reactions involved in production of ethanol from sugarcane -



Schematic of process of sugarcane to produce ethanol and sugar -



Factors affecting concentration of molasses -

- ▶ Variety of cane
- ▶ Composition of soil
- ▶ Climatic conditions
- ▶ Harvesting practices
- ▶ Sugar manufacturing process
- ▶ Handling and storage



Major engineering problems -

- ▶ Collection and storage of molasses.
- ▶ Maintenance of sterile and specific yeast culture conditions.
- ▶ Batch versus continuous operations.
- ▶ Waste disposal problem.
- ▶ Fuel economy in the series of distillation.



Uses of ethanol -

- ▶ Ethanol can be used as a fuel.
- ▶ Ethanol can also be used as a rocket fuel.
- ▶ Ethanol can be used as alcoholic beverages.
- ▶ It can be used as an antiseptic.
- ▶ Ethanol is easily miscible in water and is good solvent.
- ▶ Ethanol is less polar than water and used in perfumes and paints industry.



References –

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THANK YOU 😊

Any Queries ??

