

*Title:* **Design of a plant for bioethanol production from sugarcane.**

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The following report presents of the preliminary design of a bioethanol plant from sugarcane. To design the plant, it is necessary to choose its location, the type of sugarcane and the optimal conditions for its plantation. The plant is divided into three stages: food conditioning, fermentation and ethanol purification. Sugarcane is made up of sucrose, water, fiber, and impurities. Depending on the type of cane used and the environmental conditions of the plantation, the percentage of sucrose will be modified. In this case, it is interesting that this amount be as high as possible since it will be the one that is later fermented and provides us with the desired compound.

The food conditioning consists firstly in the milling of the cane to obtain the water and the sucrose and discard the fiber. Next, it goes on to clarification where the pH is adjusted with SO<sub>2</sub> to optimize the process and it is alkalized to adjust the Baumé degrees using milk of lime. Finally, the juice is heated and fermented. In this stage, sucrose is first transformed into fructose and glucose by adding an enzyme and then, these are fermented in ethanol by adding the yeast *Saccharomyces Cerevisiae*.

Finally, we proceed to the ethanol purification, for this first a Flash separator is necessary that is responsible for the separation of the CO<sub>2</sub> generated in the fermenter. Next, it is passed to the first distillation column in which a mixture of ethanol and water close to the composition of the azeotrope is obtained at the top of the column and finally, it is passed to the second column in which an extracting agent, MTBE, is added. In this case, to purify the ethanol to a composition of 99.7%.

**Keywords:** Bioethanol, sugarcane, food conditioning, fermentation, ethanol purification, sucrose, *Saccharomyces Cerevisiae*, MTBE.