

Development of a process scheme for the biotechnological production of erythritol.

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The reduction of sugar intake by adults is one of the main concerns in the current times. The World Health Organization stated that high sugar intake diets increase the risk of suffering non-communicable diseases. For this reason, the production of sugars substitutes becomes an essential driver for the biotechnological industry. Due to its properties, including sweetness equivalence, cooling aftertaste, high digestive tolerance, among others, erythritol is a four-carbon polyol recognized as a suitable option for sucrose substitution.

At an industrial scale, erythritol is produced by biotechnological route using microorganisms like *Yarrowia lipolytica* and *Moliniella pollinis*, transforming the substrate commercial glucose into erythritol and other substances by-products. The academic literature reports several studies regarding cultivation modes and operational conditions. However, few attempts have been made to calculate overall mass and energy balances using simulation tools for engineering.

This study presents a simulation approach for the biotechnological production of erythritol. For this purpose, the commercial simulation software ASPEN Plus V10.0 (Aspen Technologies Inc, USA) was used as the main tool. A proposed simulation flowsheet was evaluated considering the operation units (i.e., reactors, separators, heat exchange units) involved in the upstream and downstream section for erythritol production. The input information was defined from experimental results and values taken from the literature. All thermodynamic and chemical properties for conventional molecules were obtained from different sources (Aspen database, Nist database and NREL database). The thermodynamic model used during the simulation was the Non-Random Two-Liquid (NRTL).