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Technical and economic potential evaluation of the strain *Escherichia coli* MS04 in the ethanol production from glucose and xylose.

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Highlights

- Ethanol is produced from xylose and glucose using a genetic modified strain.
- Inoculum concentration reduces fermentation time.
- The modified strain presents yields very close to the theoretical.
- The process was simulated to develop a technical and economic analysis.
- The scale of production has great influence on the distribution of costs.

Abstract: Currently, the production of energy from fossil fuels is generating great pollution. For this reason, alternatives to these fuels that are less polluting, such as biofuels, have been sought. These can be produced from hydrolysates containing glucose and xylose. Metabolic engineered microorganisms are required to consume both sugars and to improve the feasibility of these processes. In this paper, the production of ethanol is evaluated using a medium that simulates a hydrolysate of corn stover (25 g/L xylose, 35 g/L glucose) with the metabolic engineered *Escherichia coli* strain MS04. The influence of the initial concentration of biomass on the production of ethanol was analyzed. With the experimental results, a technical and economic analysis of the entire process is performed with the Aspen Plus software. As a result, it is highlighted that the initial concentration of biomass only affects the fermentation time since, at a lower concentration, a longer fermentation time is required to reach a final ethanol concentration of 30 g/L. The scale of the process influences the distribution of costs is influenced by the scale of the process. On a larger scale, the raw materials represent the higher share and the depreciation on the smaller one. The use of a metabolic engineered strain allows the better use of the obtained hydrolysates from agroindustrial residues.

Keywords: Ethanol, Metabolic Engineering, Economic assessment

1. Introduction

In recent decades, there has been an increase in the demand for fuels used in industry and transport. These fuels are obtained from petroleum, which has been decreasing its availability in nature and thus, increasing its cost. In addition, these fuels (produced through petrochemical routes) generate significant amounts of toxic compounds that are released into the atmosphere causing large pollution problems [1]. For this reason, new alternatives to fossil fuels that can be less polluting and with lower production costs have been evaluated [2]–[4]. One of the best alternatives found are