Ethanol production from sugar cane bagasse hydrolysate by *Pichia stipitis* NRRL Y-7124: Monod kinetic model

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Abstract

Ethanol production from lingocellulosic biomass has grown in importance in Brazil and the world is driven by the urgent need for using cleaner fuels in a renewable way. The alcoholic fermentation is the most used and economical way to get ethanol in our country and mathematical modeling can give good contributions to the understanding of this process. The fermentation of hemicellulosic hydrolysate into ethanol is still a bottleneck in an establishment of a large scale ethanol production from lingocellulosic biomass. Mathematical approaches have been development to identify the main phenomena that interfere with the process under analysis as substrates and products limitations. This work was performed to determine kinetics parameters in a batch process for ethanol production by using the Monod kinetic model. The experimental data were obtained under laboratory conditions considering a batch fermentation process in which the yeast *Pichia stipitis* NRRL Y-7124 and a sugar cane bagasse hemicellulosic hydrolysate were used as inoculum and substrate, respectively. The approach used was the statistical analysis (linearization of the model) carried out in EXCEL, which aims to validate and to improve knowledge of the process and the quality of existing models. The ethanol yield, volumetric productivity and efficiency were 0,28 g/g, 0,102 g/L*h and 55.34%, respectively. The kinetic parameters were obtained by a fit curve, which adjust the inverse of specific growth rate to the inverse of substrate concentration and the values obtained for μ_{max} and K_S were 0,16 h^{-1} and 117,4 g/L, respectively.

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