SOLID-STATE ENZYMATIC HYDROLYSIS OF SUGARCANE BAGASSE UNDER COMPRESSED LIQUEFIED PETROLEUM GAS

Juliana R. F. Silva[(1)], Keli C. Cantelli[(1)], Marcus V. Três [(1)], Clarissa Dalla Rosa[(1)], Monica B. A. Soares[(1)], J. Vladimir Oliveira[(2)], Helen Treichel[(3)] and Marcio A. Mazutti[(4)]*

(1) Department of Food Engineering, URI- Campus de Erechim
Av. Sete de Setembro, 1621, Erechim, RS, 99700-000, BRAZIL

(2) Department of Chemical and Food Engineering
Federal University of Santa Catarina- UFSC
Florianópolis, CEP 88800-000, Florianópolis - SC, BRAZIL

(3) Federal University of Fronteira Sul
Erecgim, 99700-000, BRAZIL

(4) Department of Chemical Engineering - Federal University of Santa Maria
Av. Roraima, 1000, Santa Maria, RS, 97105-900, BRAZIL

This work investigates the solid-state enzymatic hydrolysis of sugarcane bagasse under compressed liquefied gas to produce fermentable sugar. For this purpose, a central composite design was carried out to evaluate the influence of pressure (50 to 200 bar), moisture content (40 to 80 wt%) and enzyme load (2 to 10 wt%). The temperature of all experimental runs was maintained at 47°C and the kinetic of hydrolysis was evaluated during 4 hours. The experiments were performed in a laboratory-scale unit, which basically consists of a solvent reservoir, a thermostatic bath, a syringe pump and a stainless steel vessel (cell) with an internal volume of 30 mL. The high-pressure cell was charged with sugarcane bagasse at specified moisture content and enzyme load. Afterwards, the reaction was carried out during 4 hours and the amount of fermentable sugar obtained during the reaction was determined. From the results it is seen that the amount of fermentable sugar ranged from 0.16 to 0.25 grams of sugar per gram of dried bagasse. The highest yield was obtained at moisture content, enzyme load and system pressure of 80 wt%, 10 wt% and 200 bar, respectively. From the kinetic analysis was verified a pronounced increase on the amount of fermentable sugar in the first hour of reaction. The results obtained in this work are promising since a significant increase in the amount of fermentable sugar was obtained using compressed liquefied petroleum gas as reaction media. In addition, the solid-state reaction showed advantage over liquid reaction, since the use of water during the reaction was considerably reduced.

Keywords: sugarcane bagasse, cellulase, liquefied petroleum gas.

*Corresponding author: mazutti@ufsm.br