EVALUATION OF CHEMICAL AND BIOLOGICAL PRETREATMENT OF LIGNOCELLULOSIC SUBSTRATES FOR THE OBTENTION OF FERMENTABLE SUGARS

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Introduction. The use of different pretreatments on lignocellulosic biomass would improve cellulose and hemicellulose accessibility to the enzymatic saccharification agents. In this work, we analyze the effect of ozonolysis, basic/oxidizing and a biological pretreatment using the lacasse and cellulases produced by *Pycnoporus sanguineus CeIBMD001* on sugarcane bagasse, Taiwan grass and balsa wood.
The objective of the work is to evaluate the effectiveness of the pretreatments according to the delignification and generation of fermentable sugars after enzymatic hydrolysis; in order to select the adequate pretreatment for each biomass.

Methods. The ozonolysis pretreatment was performed during 2 h. We optimized the basic/oxidizing pretreatment through an experimental design varying the temperature, H_2O_2 and NaOH concentration. We quantified the content of reducing sugar (RS) using the DNS assay (1), total sugar (TS) using phenol-sulfuric assay (2) and soluble lignin (SL) (3). The enzymatic hydrolysis was accomplished with a commercial enzymatic preparation (called E7).

Results. The effectiveness of pretreatment was determined by quantification of soluble lignin before and after each pretreatment and by the generation of RS and TS after saccharification. The ozonolysis pretreatment enhanced the enzymatic hydrolysis by the increase of TS and RS (Table 1) in comparison with the obtained without pretreatment (data not showed).

Table 1. Saccharification of biomass pretreated by ozonolysis.

Biomass	% SL	% TS	% RS
Cane bagasse	3.21	11.51	4.98
Madera de Balsa	3.39	18.84	13.81
Taiwan grass	2.87	13.05	11.28

The best conditions of the basic/oxidizing pretreatment to increased lignin solubility were 30% H_2O_2, 3% NaOH at 40 ºC for sugarcane bagasse and 80 ºC for balsa wood and Taiwan grass. It is recognized that lignin removal enhances cellulose digestibility (4). We have selected 30 min of pretreatment time according with the TS and RS produced after enzymatic hydrolysis (Table 2). The basic/oxidizing pretreatment increases the susceptibility of polysaccharides to enzymatic hydrolysis (5).

Table 2. Saccharification of biomass pretreated during 30 min with the best basic/oxidizing conditions.

Biomass	% SL	% TS	% RS
Cane bagasse	7.44	26.55	17.97
Madera de Balsa	4.08	22.55	16.60
Taiwan grass	4.47	25.75	20.36

Conclusions. The ozonolysis and basic/oxidizing pretreatment enhance both the enzymatic digestion. The most soluble lignin and sugar concentration were obtained by the basic/oxidizing pretreatment. It remains left the evaluation of biological pretreatment with *Pycnoporus sanguineus CeIBMD001*

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