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Physico-chemical kinetic modelling of hydrolysis of a steam-explosion pre-treated corn stover: A two-step approach

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1 **Physico-chemical kinetic modelling of hydrolysis of a steam-explosion pre-treated**  
2 **corn stover: A two-step approach**

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8 ABSTRACT

9 A physico-chemical kinetic model for the hydrolysis of pre-treated corn stover is  
10 proposed. This model takes into account two reactions in series, the hydrolysis of  
11 cellulose to cellobiose and the production of glucose from cellobiose. Experiments have  
12 been carried out with an industrial enzymatic cocktail from *Trichoderma reesei*  
13 containing endo and exoglucanases and a very low activity of  $\beta$ -glucosidase. Kinetic  
14 parameters were calculated by fitting the proposed model to experimental data of  
15 cellulose and glucose concentrations with time. The kinetic parameters fulfilled all  
16 relevant statistical and physical criteria. The kinetic model has been validated with  
17 published saccharification data regarding differently pre-treated corn stover and  
18 enzymatic cocktail, in this case with a very high  $\beta$ -glucosidase activity (as it is common  
19 in modern industrial cellulase cocktails). In both cases, the kinetic model proposed  
20 could be fitted very appropriately to cellulose hydrolysis data.

21 KEYWORDS

22 Lignocellulose hydrolysis; kinetic model; cellulase:  $\beta$ -glucosidase; corn stover

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