

ENZYMATIC CONVERSION OF CELLULOSE FROM SCB PRETREATED BY ELECTRON BEAM COMBINED TO HYDROTHERMAL AND STEAM EXPLOSION

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The combination of pretreatment technologies intend to decrease the severity of the processes and to avoid the excessive leading to sugar degradation and formation of toxic byproducts as aliphatic acids, e.g. acetic, formic and levulinic acid, furan derivatives, e.g. furfural and 5-hydroxyl-methyl-furfural (HMF), and phenol compounds that are formed during the saccharification of lignocelluloses. In this way the present study reports the enzymatic hydrolysis of SCB submitted to four kinds of pretreatment combination: electron beam processing (EBP), EBP followed by diluted acid (EBP-AT) and hydrothermal treatment (EBP-HT) and steam explosion (pressurized at 15.7 kg.cm², heated to 200°C), followed by EBP (EBP-SE). SCB and SE samples were irradiated using a Radiation Dynamics Electron Beam Accelerator with 1.5 MeV and 37 kW. The applied absorbed doses were 10 to 150 kGy. The enzymatic hydrolysis (EH) was studied using five commercial preparations, kindly supplied by Novozymes (Bagsvaerd, Denmark). The EH yields using Celluclast and β -glucosidase increased from 4 to 50% when the SCB samples were treated by TH at 180°C for 40 minutes and reached 71% when SCB samples were EBP with 50 kGy, and submitted to AH with 0.1% of sulfuric acid for 40 minutes. The enzymatic conversion of cellulose in SCB samples pretreated with SE and irradiated with 10 kGy reached 64% after 24h.

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