

# Effect of Delignification with NaOH and H<sub>2</sub>O<sub>2</sub> in the Enzymatic Hydrolysis of Sugarcane Bagasse Pretreated by Steam Explosion

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This study aimed to evaluate the effect of delignification with NaOH and H<sub>2</sub>O<sub>2</sub> in the enzymatic hydrolysis yield of sugarcane bagasse pretreated by steam explosion (~ 203°C/~6 min). A 2<sup>2</sup> factorial design was used to study the conditions of delignification in the following ranges: 0.5-10% NaOH (w/w) to 50-150 °C and 1.0 to 30% H<sub>2</sub>O<sub>2</sub> (w/w) 40-100 °C. The tests were performed in a 500 mL Parr reactor with 10% (w/w) of bagasse. The enzymatic hydrolysis of pretreated- and delignified bagasse was performed in a rotating incubator at 50 °C, pH 4.8, 120 rpm for 24 h with 2% (w/w) of bagasse using the NS22074 enzyme complex (Novozymes). Statistical analysis of the delignification results with NaOH showed that the NaOH concentration has a greater effect than temperature on the lignin solubilization (S<sub>L</sub>) and on enzymatic hydrolysis yield increasing (Y<sub>H</sub>). The best results were achieved in the condition of 100 °C with 10% NaOH, being S<sub>L</sub> equal to 67.3% and 47.4% for Y<sub>H</sub> (related to pretreated bagasse). There was an increase in the values of Y<sub>H</sub> with an increasing in NaOH concentration, which are: 3.7%, 17.3% and 47.4% to 0.5%, 5.3% and 10% NaOH 100°C, respectively. Overall results of H<sub>2</sub>O<sub>2</sub> delignification showed that the lignin solubilization under the studied conditions varied little, remaining between 25 and 39%, while in the process with NaOH the range was 4.1 - 67.3%. The best results of Y<sub>H</sub> with hydrogen peroxide were obtained under the following conditions: 36.9% with 30% H<sub>2</sub>O<sub>2</sub> at 70 °C and 41.8% to 25.8% H<sub>2</sub>O<sub>2</sub> at 91 °C.

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**Key-words:** Delignification, Enzymatic hydrolysis, Pretreatment, Sugarcane bagasse, Hydrogen peroxide.

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