



Pre-treatment on Cellulosic Waste for Bio-ethanol Production

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Pre-treatment is one of the most costly steps in cellulosic ethanol production, generally accounting for 33% of total processing costs. Lowering extreme conditions for pre-treatment would be a major factor in cost reduction. Hence, this study aims to investigate the effectiveness of steam and acid pre-treatment on cellulosic waste (sawdust) on the yield of ethanol production. Steam pre-treatment was carried out by autoclaving sample at 105°C for 6 minutes, under pressure of 15 psi. Acid pre-treatment was carried out by refluxing the sample with 5% H₂SO₄ for 30 minutes. Both samples were then subjected to both acid hydrolysis by refluxing samples with 10 % H₂SO₄ for 40 hours; and enzymatic hydrolysis by using beta-glucosidase and cellulase. The hydrolysate was then fermented for the production of ethanol by using yeast. Our results showed that steam pre-treatment increase bioethanol yield significantly. Yield of bioethanol was 58% higher in steam pre-treated samples than that of acid pre-treated sample. Our results also showed that enzymatic hydrolysis was more effective than acid hydrolysis in term of bioethanol production. Yield of bioethanol in steam pre-treated samples with enzymatic hydrolysis was 224% higher than that of acid hydrolysis. This implies that expensive machinery need not be used to increase bioethanol production.