

Title Microwave-assisted Alkali Pre-treatment of Wheat Straw and its Enzymatic Hydrolysis
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Abstract

Microwave-assisted alkali pre-treatment of wheat straw and its enzymatic hydrolysis were investigated and compared with the conventional alkali pre-treatment process. First, the effect of microwave power and pre-treatment time on the weight loss and composition of wheat straw was examined. The results show that the higher microwave power with shorter pre-treatment time and the lower microwave power with longer pre-treatment time had the same effect on the weight loss and composition at the same energy consumption. The comparison was then made between the effect of the microwave-assisted alkali pre-treatment and the conventional alkali one on the weight loss and composition of wheat straw. The wheat straw had a weight loss of 48.4% and a composition of cellulose 79.6%, lignin 5.7% and hemicellulose 7.8% after 25 min microwave-assisted alkali pre-treatment at 700 W, compared with a weight loss of 44.7% and a composition of cellulose 73.5%, lignin 7.2% and hemicellulose 11.2% after 60 min conventional alkali pre-treatment. The microwave-assisted alkali pre-treatment removed more lignin and hemicellulose from wheat straw with shorter pre-treatment time compared with the conventional alkali one. Finally, the enzymatic hydrolysis of pre-treated wheat straw (substrate concentration 50 g l^{-1} , enzyme loading 20 mg g^{-1} substrate) was also investigated and the results indicate that the microwave-assisted alkali pre-treated wheat straw had higher hydrolysis rate, reducing sugar concentration and glucose content in the hydrolysate than the conventional alkali pre-treated one. Microwave-assisted alkali pre-treatment is a potential alternative of wheat straw pre-treatment for its enzymatic hydrolysis.