

Chompoonuch Loisasatrakul 2012: Reducing Sugar Production from Water Hyacinth by *Clostridium acetobutylicum* Using Box-Behnken Experimental Design. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Anusith Thanapimmetha, D.Eng. 122 pages.

The reducing sugar production from the submerged fermentation of water hyacinth with *Clostridium acetobutylicum* was studied for the optimal conditions. The components of water hyacinth by dry weight are cellulose 35.84%, hemicellulose 27.11% and lignin 8.33%. Water hyacinth was pretreated with H₂SO₄ 0.5% (w/w) and NaOH 10% (w/v). The results showed that, after the pretreatment, the compositions of water hyacinth were induced to cellulose 85.31%, hemicellulose 0.85% and lignin 1.01%. After that, the optimal condition for the reducing sugar production from water hyacinth using *Clostridium acetobutylicum*. This study employed the response surface Box-Behnken designs to find the conditions for reducing sugar production. The condition was the content of pretreated water hyacinth (10-50 g/l of the medium), temperature (30-50 °C) and incubation time (24-48 hours). The condition for reducing sugar production suggested by minitab program was the content of water hyacinth 10.16 g/l of the medium at 38.8 °C for 37.59 hours. The reducing sugar yield predicted from the statistical equation was 9.47% (g/g dry weight). The deviation value between the predicted model and the experimental results was 4.01%. Finally, the reducing sugar obtained from water hyacinth was concentrated to 15 °Brix prior to fermented by *Saccharomyces cerevisiae* TISTR 5339. The result showed that the ethanol from fermentation of water hyacinth was 2.54 g/l.

Student's signature

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