DETERMINATION KINETICS REACTION AND SUGAR REDUCTION OF WATER HYACINTH (*Eichhornia crassipes*) CELLULOSE USING COMBINATION OF ACID HYDROLYSIS AND BIOLOGICAL

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ABSTRACT

Water hyacinth (*Eichhornia crassipes*) is an aquatic species of which population is abundant in surface water and cause quality of environmental problems, such as deterioration of water quality, decreased oxygen levels and water eutrophication. This study aims to utilize water hyacinth through *pretreatment* and hydrolysis of cellulose into sugar reduction and developed into bioethanol.

This study was a laboratory experiment using inoculum *Phanerochaete chrysosporium* for *pretreatment*. Hydrolysis was done by microorganisms M-16 as microbial fermenters cellulolitic derived from the rumen of ruminant animals, along *Trichoderma viridae* and *Aspergillus niger* mold. *Pretreatment* had done over 10 days and hydrolysis for 24, 48, 72, 96 and 120 hours at a temperature of 28 ºC. Variable in this study was combination hydrolysis of 0.25% sulfuric acid with microorganisms M-16 also *T. viridae-A. niger*, without the combination of 0,25% sulfuric acid. Variable substrate variation was 1 g (0,025% w/v), 2,5 g (0,061% w/v), 5 g (0,1% w/v), 10 g (0,161% w/v) and 20 g (0,232% w/v). Reduction sugar produced in the analysis used Nelson-Somogyi method and compared the best parameters of Vmax and Km.

The results indicated the substrate concentration and duration of hydrolysis had significant effect on the average levels of reducing sugars has produced. Combination hydrolysis of sulfuric acid and 0.25% microorganisms M-16, produced high average reduction sugar was 88,66 mg/L on 24 hours hydrolysis with 20 g substrate. Average sugar content produced an overall reduction of each substrate was 68,16 mg/L. Kinetic parameters Vmax of 3,66 ppm/mg/h and Km of 3,17 mg/g.

Key Words : *A. niger*, *E. crassipes*, Hydrolysis, Kinetics Reactions (Km dan Vmax), Microorganisms M-16, *T. viridae*

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