

ABSTRACT

STUDY OF ALKALI AND ENZYMATIC PRETREATMENTS ON SUGARCANE BAGASSE TO PRODUCE REDUCED SUGAR

By

REFIARIOEN

Sugarcane bagasse is one of solid waste from sugar factories. It contains lignocelluloses that can be hydrolyzed into reduced sugar. Objectives of this study were to find out (1) the best condition (alkali concentration, lignin degradation time and temperature) of bagasse lignin degradation, and (2) the best substrate concentration and enzymatic incubation time for hydrolyzing bagasse holocelluloses into reduced sugar.

This study was performed into two phases, namely lignin degradation and enzymatic hydrolysis. During the former phase, sugarcane bagasse was immersed in alkali (NaOH, H₂O₂) solution at a variety of concentrations for a variety of times and temperatures. After degradation, samples were taken and analyzed for degree of lignin degradation. During the latter phases, 3.75% - 6.25% bagasse lignocelluloses were hydrolyzed with 10 FPU cellulase enzyme for 0 – 24 hours at pH 4.8, 50°C, and 200 rpm. After hydrolyzation process, samples were taken and analyzed for determining their reduced sugar contents. Collected data were analyzed descriptively and presented graphically. Results of this study shown that (1) the best condition for lignin degradation (> 99% lignin degraded) was immersion of the sugarcane bagasse into 1.0 M NaOH solution at 121 °C for 15

minutes, and (2) the best treatment for sugarcane bagasse enzymatic hydrolysis was a substrate concentration of 6.25% and a hydrolysis time of 18 hours. The hydrolysis treatment yielded a reduced sugar content of 19.29g/L and a bagasse carbon conversion of 12,4%.

Key words: alkali, bagasse, pretreatment, NaOH, enzymatic hydrolysis.