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Research Article

Enzymatic Hydrolysis of Alkaline Pretreated Coconut Coir

Akbarningrum Fatmawati [1]*, Rudy Agustriyanto [1], Yusnita Liasari [2]

[1] *Department of Chemical Engineering, Surabaya University, Jl. Raya Kalirungkut, Surabaya 60292, Indonesia*

[2] *Biotechnology Faculty, Surabaya University, Jl. Raya Kalirungkut, Surabaya 60292, Indonesia*

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Abstract

The purpose of this research is to study the effect of concentration and temperature on the cellulose and lignin content, as well as the reducing sugars produced in the enzymatic hydrolysis of coconut coir. In this research, the coconut coir is pretreated using 3%, 7%, and 11% NaOH solution at 60 °C, 80 °C, and 100 °C. The pretreated coir were assayed by measuring the amount of cellulose and lignin and then hydrolysed using Celluclast and Novozyme 188 under various temperature (30 °C, 40 °C, 50 °C) and pH (3, 4, 5). The hydrolysis results were assayed for the reducing sugar content. The results showed that the alkaline delignification was effective to reduce lignin and to increase the cellulose content of the coir. The best delignification condition was observed at 11% NaOH solution and 100 °C which removed 14.53% of lignin and increased the cellulose content up to 50.23%. (*Selected Paper from International Conference on Chemical and Material Engineering (ICCME) 2012*)

Keywords: coconut; enzyme; hydrolysis; lignocellulose

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1. Introduction

The lignocellulosic biomass is represented by the high-level crop, hard wood and soft wood with cellulose, hemicellulose and lignin as the main component. One of the lignocellulosic biomass available in Indonesia is coconut coir. Coconut productivity in Indonesia is very high, reaching 15.5 billion coconuts per year, which is equivalent to 3.02 million tons of copra, 3.75 million tons of water, 0.75 million tons of shell, 1.8 million tons of coir fiber, and 3.3 million tons of coir dust. The coconut processing industries are still largely focused on coconut meat processing, while the process industry of its byproducts such as coconut water, coconut coir and coconut shell is still in small scale and traditional [1]. However, the potential of the byproduct is very large, especially the coconut coir.

Coconut coir is composed of cellulose, lignin, pectin, hemicellulose, and ash. Cellulose can be processed and converted into alternative energy sources such as ethanol, and biohydrogen via fermentation. In order to utilize the cellulose for fermentation substrate, it must be hydrolyzed either chemically or enzymatically to produce sugar.

Cellulose is the b-1,4-polyacetal of cellobiose which is a polymer of glucose. This cellulose mole-

* Corresponding Author. (A. Fatmawati)
E-mail: akbarningrum@ubaya.ac.id
Tel: +62-31-2981158, Fax: +62-31-2981158