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Research Article

Study of Enzymatic Hydrolysis of Dilute Acid Pretreated Coconut Husk

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Abstract

Coconut husk is classified as complex lignocellulosic material that contains cellulose, hemicellulose, lignin, and some other extractive compounds. Cellulose from coconut husk can be used as fermentation substrate after enzymatic hydrolysis. In contrary, lignin content from the coconut husk will act as an inhibitor in this hydrolysis process. Therefore, a pretreatment process is needed to enhance the hydrolysis of cellulose. The objective of this research is to investigate the production of the glucose through dilute acid pretreatment and to obtain its optimum operating conditions. In this study, the pretreatment was done using dilute sulfuric acid in an autoclave reactor. The pretreatment condition were varied at 80°C, 100°C, 120°C and 0.9%, 1.2%, 1.5% for temperature and acid concentration respectively. The acid pretreated coconut husk was then hydrolyzed using commercial cellulase (*celluclast*) and β -glucosidase (Novozyme 188). The hydrolysis time was 72 hours and the operating conditions were varied at several temperature and pH. From the experimental results it can be concluded that the delignification temperature variation has greater influence than the acid concentration. The optimum operating condition was obtained at pH 4 and 50°C which was pretreated at 100°C using 1.5% acid concentration. © 2012 BCREC UNDIP. All rights reserved. (Selected Paper from International Conference on Chemical and Material Engineering (ICCME) 2012)

Keywords: Coconut; Enzyme; Hydrolysis; Lignocellulose

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1. Introduction

Lignocellulosic biomass is the most abundant renewable biomass on earth. This material consists of mainly cellulose, lignin, and hemicellulose. Cellulose and hemicellulose can be categorized as carbohydrate polymer. Carbohydrate polymer contains sugar units which is capable of being fermented into biohydrogen or other chemical. One

of the most obtainable lignocellulosic biomass in Indonesia is coconut husk.

Coconut husk contributes 35% weight in coconut. Coconut husk is characterized as light, elastic, and water resistant. The coconut husk is composed of lignin (45.4%), cellulose (43.44%), pectin (3%), hemicellulose (0.25%) and ash (2.22%) [1].

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