

ADVANCES IN MATERIALS ENGINEERING

Volume 1

Edited By:
Zahurin Halim
Iskandar Idris Yaacob
Md Abdul Maleque



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Extraction of Glucose From Kenaf Core by Using Chemical Pre – Treatment Process

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Keywords: Kenaf, lignocellulosic materials, pre-treatment, glucose.

Abstract. Kenaf (*Hibiscus cannabinus*) is one type of lignocellulosic materials which is found to be the best alternative plant to substitute the raw material for lactic acid and ethanol production due to its short period of harvest time and process high quality cellulose. Since it is a lignocellulosic material, it is naturally resistant to breakdown to its structural sugars that will inhibit microorganisms to be accessed through. Therefore, it needs to undergo pre - treatment process by mild acid hydrolysis in order to liberate glucose. The optimum conditions that can liberate highest percentage of glucose conversion occurred at run 12 which 3 gram of kenaf core was treated at 135 °C for 120 minutes. The maximum glucose produced in this study is 2.7 % which is equivalent to 0.811 g/L.

Introduction

Kenaf scientifically known as *Hibiscus cannabinus* is a warm season annual fibre crop. It is a jute-like plant origin from the hibiscus family that can be used as raw material to produce various products. Since the world trend nowadays is heading towards green technology, the demand for kenaf has dramatically increases as it is an environmental friendly industrial plant [1].

Lignocellulosic biomass represents the largest organic carbon sources by green plants. Kenaf is one type of lignocellulosic materials. Lignocellulose is classified into biomass since it contains some materials embedded in it. Those materials are cellulose, hemicellulose and lignin which cause the lignocellulose to have a complex structure that cannot be directly converted into end products such as ethanol and lactic acid [2,3]. Therefore, lignocellulosic material must undergo two processes which are hydrolysis of cellulose in the lignocellulosic materials to fermentable reducing sugars, and fermentation of the sugars to lactic acid [3].

Pre – treatment or hydrolysis of cellulose is required in order to produce fermentable reducing sugar or glucose. The main purpose of the pre - treatment is to remove lignin and hemicellulose, reduce cellulose crystallinity, and increase the porosity of the materials. There are many type of pre – treatment process which is physical, chemical and biological pre – treatment process. This study only focusing on chemical pre – treatment since it is more cost effective compare to physical and biological pre – treatment. There are two type of chemical pre - treatment which comprises acid and alkaline hydrolysis. In dilute acid hydrolysis such as H₂SO₄, the pre-treatment can achieve high