

**THE OPTIMIZATION OF SODIUM HYDROXIDE
(NaOH) PRETREATMENT FOR REDUCING
SUGAR PRODUCTION FROM RICE HUSK**

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PRETREATMENT FOR REDUCING SUGAR PRODUCTION
FROM RICE HUSK**

By

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TABLE OF CONTENTS

	PAGE
AUTHOR'S DECLARATION	i
SUPERVISOR'S CERTIFICATION	ii
COORDINATOR'S CERTIFICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF SYMBOLS	x
LIST OF ABBREVIATION	xi
ABSTRACT	i
CHAPTER ONE INTRODUCTION	1
1.1 Introduction	1
1.2 Problem Statement	3
1.3 Objectives	4
1.4 Scope of Work	5
CHAPTER TWO LITERATURE REVIEW	6
2.1 Lignocellulosic Biomass	6
2.1.1 Introduction to Lignocellulosic Biomass	6
2.1.2 Compositional Characteristics Various Types Lignocellulosic Biomass	7
2.2 The Importance of Pretreatment Towards Lignocellulosic Biomass	9
2.3 Pretreatment Alternatives for Derivation of Reducing Sugar	9
2.3.1 Physical Pretreatment	10
2.3.2 Chemical Pretreatment	12
2.3.3 Physico-chemical Pretreatment	13
2.3.4 Biological Pretreatment	16
2.4 Alkaline Pretreatment on The Production of Reducing Sugar	17
2.5 Effect of Alkaline Concentration to The Production of Reducing Sugar	18

ABSTRACT

Lignocellulosic biomass is an abundant renewable resource that contributes to a worldwide output of up to 1.3 billion tonnes per year and is a suitable raw material that may be utilized in a variety of applications for human sustainability. It is mostly composed of cellulose, hemicellulose, and lignin, which are tightly bound together. The objective of pretreatment for lignocellulosic biomass is to break down the complex structure of biomass and to provide better access to the components to be converted into useful reducing sugar. The removal of strong and uneven lignin, which is very resistant to solubilization and a key inhibitor for the hydrolysis of cellulose and hemicellulose, is a major impediment. This has prompted much study into the creation of a variety of pretreatment techniques. Consequently, alkaline pretreatment is an essential step in the manufacture of reducing sugar from lignocellulosic biomass. To obtain a high conversion of reducing sugar, it is necessary to optimise the alkaline pretreatment using the Design Expert programme in order to determine the optimal values for the factors influencing the pretreatment. Response Surface Methodology (RSM) was used to optimize the parameter. Sodium hydroxide concentration, pretreatment time and solid loading were selected with the range of 1 to 4 %w/v, 15 to 60 minutes and 6 to 16 %w/v respectively. The total amount of reducing sugar was calculated using the DNS approach. Rice husk was the biomass that had different optimal pretreatment conditions that affect the generation of reducing sugar. The RSM provide numerical, graphical and 3D plot interaction that shows the optimum condition to produce highest reducing sugar. It was observed that 1.67 %w/v of sodium hydroxide pretreatment, 59.44 minutes of pretreatment time and 7.67 %w/v of solid loading produce 15.18 mg/mL of xylose from the rice husk. Therefore, less alkaline reagent was used with longer pretreatment time which can reduce the cost of pretreatment. RSM is one of the best method to replace the conventional method to optimize the parameter of the alkaline pretreatment of rice husk for reducing sugar production.