THE POTENTIAL OF OCTANOIC ACID : DL-MENTHOL HYDROPHOBIC DEEP EUTECTIC SOLVENT FOR DELIGNIFICATION OF OIL PALM EMPTY FRUIT BUNCH

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This Final Year Project Report entitled "**The Potential Of Octanoic Acid : DL-Menthol Hydrophobic Deep Eutectic Solvent For Delignification Of Oil Palm Empty Fruit Bunch"** was submitted by Bahirah Binti Mohd Yusoff in partial fulfillment of the requirements for the Degree of Bachelor of Sciences (Hons.) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

THE POTENTIAL OF OCTANOIC ACID : DL-MENTHOL HYDROPHOBIC DEEP EUTECTIC SOLVENT FOR DELIGNIFICATION OF OIL PALM EMPTY FRUIT BUNCH

The Oil Palm Empty Fruit Bunch (OPEFB) is found to be suitable for bioethanol production but the presence of lignin in the structure could inhibit further processing. Deep eutectic solvents (DES) have garnered attention for their ability to delignify OPEFB with promising results without relying on toxic chemicals. However, there is limited research on the use of hydrophobic DES (HDES) for lignin extraction in OPEFB. While most previous studies have focused on hydrophilic DES, HDES could be more suitable due to hydrophobic nature of the lignin. Therefore, this study evaluated the effect of temperature and time on the potential of octanoic acid and DL-menthol HDES for delignification of OPEFB at a 2:1 mole ratio. It was found that the extraction efficiency of lignin increases from 22.22% to 88.89% as the extraction temperature increases from 25 °C to 100 °C. This is due to the decreased in viscosity and density of HDES at higher temperature, providing easier access to lignin in OPEFB. Under the similar conditions, it was observed that the percent of solid recovery decreases from 77.44% to 64.94% due to deterioration of structural elements in OPEFB. Inversely, the increasing of extraction time from 5 minutes to 25 minutes reduces the extraction efficiency of lignin from 88.89% to 22.22%. This could be due to the formation of pseudo-lignin and new monomers like lignin at extended duration which hinders the interaction between HDES and lignin in OPEFB. In contrast, the percent of solid recovery was found to be increased with the increase of extraction time from 64.06% to 79.14%. Lignin extraction was further confirmed through functional group analysis where weakened C-O and -OH groups of alcohol and C=O group for esters peaks were observed which indicated the decrease of lignin content in the treated OPEFB, thus proving the potential of the prepared HDES for lignin extraction of OPEFB.

TABLE OF CONTENTS

ABSTRACT		ii
ABSTRAK		iii
ACKNOWLEDGEMENTS		iv
TABLE OF CONTENTS		v
LIST OF TABLES		vii
LIST OF FIGURES		viii
LIST OF SYMBOLS		ix
LIST OF ABBREVIATIONS		x
CHAPTER 1 : **INTRODUCTION**		1
1.1	Background of study	1
1.2	Problem statement	4
1.3	Objectives	6
1.4	Significance of study	6
1.5	Scope and limitation of study	7
CHAPTER 2 : **LITERATURE REVIEW**		8
2.1	Overview of oil palm empty fruit bunch (OPEFB)	8
2.2	Lignin in oil palm empty fruit bunch (OPEFB)	9
2.3	Pretreatment steps for lignin extraction in OPEFB	11
	2.3.1 Physical pretreatment	11
	2.3.2 Biological pretreatement	13
	2.3.3 Chemical pretreatment	13
2.4	Deep eutectic solvents (DESs)	17
	2.4.1 Types of DESs	17
	2.4.2 Usage of DES in pretreating of OPEFB	20
CHAPTER 3 : **RESEARCH METHODOLOGY**		23
3.1	Materials, chemicals and instrumentations	23
	3.1.1 Materials	23
	3.1.2 Chemicals and instrumentations	24
3.2	Preparation and analysis of HDES	24
	3.2.1 Preparation of HDES	24
	3.2.2 Hydrophobicity and pH test on the prepared HDES	24
3.3	Delignification process of OPEFB by HDES	25
3.4	Lignin content analysis using UV-Vis Spectrophotometer	26
3.5	Solid recovery	27
3.6	Functional group analysis Using FT-IR Spectroscopy	27
	3.6.1 Prepared HDES	27
	3.6.2 Raw and treated OPEFB	28