

NUR ILYANA BINTI ISMAIL

AS245 FSG

UiTM

**THE EFFECT OF DEEP EUTECTIC SOLVENT
OF DL-MENTHOL AND LINOLEIC ACID TO
THE PROPERTIES OF PECTIN-STARCH
BIOFILM**

NUR ILYANA BINTI ISMAIL

**BACHELOR OF SCIENCE (Hons.)
APPLIED CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

AUGUST 2024



UNIVERSITI
TEKNOLOGI
MARA

Fakulti
Sains Gunaan

**SUBMISSION FOR EVALUATION
FINAL YEAR PROJECT 2 - RESEARCH PROJECT**

**THE EFFECT OF DEEP EUTECTIC SOLVENT OF DL-MENTHOLAND
LINOLIEC ACID TO THE PROPERTIES OF PECTIN-STARCH BIOFILM**

Name : NUR ILYANA BINTI ISMAIL
Student ID : 2022786387
Program : AS245
Course code : FSG671
Mobile Phone : 0175434865
E-mail : ilyanalyana99@gmail.com

Approval by Main Supervisor:

I certify that the work conducted by the above student is completed and approve this report to be submitted for evaluation.

Supervisor's name : DR. RIZANA YUSOF
Date : 5 JULY 2024
Turnitin Similarity % : 26%
Signature :

**THE EFFECT OF DEEP EUTECTIC SOLVENT OF DL-
MENTHOL AND LINOLEIC ACID TO THE PROPERTIES OF
PECTIN-STARCH BIOFILM**

NUR ILYANA BINTI ISMAIL

**Final Year Project Proposal Submitted in
Partial Fulfilment of the Requirements for
the Degree of Bachelor of Science (Hons.)
Applied Chemistry in the Faculty of
Applied Sciences Universiti Teknologi
MARA**

AUGUST 2024

ABSTRACT

THE EFFECT OF DEEP EUTECTIC SOLVENT OF DL-MENTHOL AND LINOLEIC ACID TO THE PROPERTIES OF PECTIN-STARCH BIOFILM

Pectin-starch biofilms offer a sustainable alternative for various applications, including food packaging, but often suffer from poor mechanical properties and moisture susceptibility. This study explores the effect of deep eutectic solvents (DESs) composed of DL-menthol and linoleic acid on these biofilms. By incorporating varying concentrations of DES at 5%, 6% and 7%, the changes in mechanical performance, water solubility, moisture content, and opacity were investigated. Thus, the FTIR (Fourier-transform infrared) analysis to assess chemical interactions also were conducted. Result indicated that the biofilm with 5%, 6% and 7% DES concentration exhibited higher water solubility (73.58%, 73.68 % and 75.40%) and moisture content (10.40%, 13.24%, 21.24%), leading to increased opacity. Additionally, the biofilms with 5% DES were selected for mechanical property testing with control biofilm due to its properties that has lower moisture content, water solubility and its apparency that less brittle than biofilm with 6% and 7% DES. Biofilm with 5% DES had lower tensile strength (13 MPa) compared to those without DES (14 MPa), suggesting reduced mechanical robustness and increasing the flexibility of biofilm. While DES enhanced the cohesion of the biofilms, they also introduced challenges such as higher susceptibility to moisture and decreased mechanical performance. These findings suggest that while DESs impact certain properties of pectin-starch biofilms, further optimization is needed to balance mechanical strength with other desirable qualities for practical applications.

TABLE OF CONTENTS

	PAGE
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	ix
ABSTRACT	i
ABSTRAK	ii
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	3
1.3 Research of study	5
1.4 Objective of study	5
1.5 Significant of study	7
1.6 Expected outcome	8
CHAPTER 2 LITERATURE REVIEW	
2.1 Introduction of biofilm food packaging	
2.1.1 Food packaging	9
2.1.2 Third generation bio-based food packaging	13
2.1.3 Drawback of Polysaccharide Packaging	17
2.2 Material uses	
2.2.1 Starch	20
2.2.2 Pectin	22