

**VALORIZATION OF STARCH FROM BANANA PEEL WASTE
INTO BIOPLASTIC: ANALYSIS OF PHYSICAL AND
MECHANICAL PROPERTIES**

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This Final Year Project Report entitle “**Valorization of Starch from Banana Peel Waste into Bioplastic: Analysis of Physical and Mechanical Properties**” was submitted by Syalin Norain Binti Sya’ad in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Chemistry, in the Faculty of Applied Sciences and was approved by

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ABSTRACT

VALORIZATION OF STARCH FROM BANANA PEEL WASTE INTO BIOPLASTIC: ANALYSIS OF PHYSICAL AND MECHANICAL PROPERTIES

Banana peel waste (BPW) is valorized in this study for the development of bioplastics as a raw material with the aim of obtaining biodegradable and environment-friendly substitutes for conventional plastics. The main objectives include the development and characterization of BPW-based bioplastics in combination with tapioca and corn starch, focusing on their physical, mechanical, and chemical characteristics. The banana peel waste turned out to be pre-treated, dried, and ground and was made in fine starch powder, which was then mixed with starchy cross linker and glycerol to make different compositions. The different samples of bioplastic were analyzed using Fourier-transform infrared spectroscopy (FTIR), optical microscopy, water absorption test, ultraviolet visible spectrophotometry, and mechanical property testing with a universal testing machine. The results showed that the formulation significantly affected the properties of the bioplastic: increasing amounts of BPW resulted in increased water absorption while tensile strength and transparency were reduced, while increasing proportions of tapioca and corn starch improved mechanical properties and optical clarity. FTIR confirmed the existence of the relevant functional groups that give rise to polymer interactions, while microscopy indicated surface imperfections and structural differences among the blends. The ideal formulation aims to balance the two most essential components to yield good characteristics for its specific application in bioplastics. In summary, bioplastics based on BPW are promising biodegradable and sustainable materials, but further optimization and studies on scale-up are suggested to improve their commercial viability and application in various industries.

TABLE OF CONTENTS

ABSTRACT	iii
ABSTRAK	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF PLATES	xi
LIST OF SYMBOLS	xii
LIST OF ABBREVIATIONS	xiii

CHAPTER 1 INTRODUCTION

1.1	Background of study	1
1.2	Problem statement	3
1.3	Significance of study	3
1.4	Objectives of study	4
1.5	Scope and limitation of study	5

CHAPTER 2 LITERATURE REVIEW

2.1	Introduction to plastic	6
2.1.1	Their environmental impact	8
2.2	Bioplastic: A sustainable solution	8
2.2.1	Benefits of bioplastic	9
2.3	Starch-based bioplastic	11
2.4	Banana	11
2.4.1	Banana peel waste	12
2.5	Blending starches for enhanced bioplastic	14
2.5.1	Impact of amylose and amylopectin ratios on blends	15
2.6	Plasticizer	16
2.6.1	Glycerol	17
2.7	Cross-linking agent	18
2.7.1	Acetic acid	18
2.8	Characterization of bioplastic	19
2.8.1	Fourier-transform Infrared Spectroscopy Analysis	19
2.8.2	Microscopy Analysis	20
2.8.3	Water Absorption Analysis	21
2.8.4	UV-Visible Spectrophotometers Analysis	21
2.8.5	Mechanical Analysis	22