

UNIVERSITI TEKNOLOGI MARA

**THE EFFECT OF PLASTICIZERS
TOWARDS THE
CHARACTERISTICS OF
METHYLCELLULOSE FILM
PACKAGING**

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ABSTRACT

The usage of petroleum-based film packaging cause a serious environmental problem, which it will affect the human health as well as human especially marine life. The main objective of this study is to study the effect of different plasticizers on the methylcellulose (MC) based film food packaging. Sorbitol and red palm oil (RPO) are used as the plasticizers. The films were prepared by using solution-casting method. Then, the films are characterized on chemical properties by using FTIR, light transmission and transparency properties by using UV-Vis Spectrophotometer and tensile strength properties to observe the strength of the films. From the FTIR spectra, the presences of characteristics bands of MC structure are observed in all films. The result shows that sorbitol and RPO are exists in the MC structure. From UV-Vis study, MC/Sor films are more opaque compared to the MC/RPO films. The tensile strength of the film are decreasing as well as the elongation at break, which might occur due to the modified interactions between the plasticizers and the chemical structure of the film. The elastic modulus of pure MC is the highest compared to the other MC incorporated with plasticizers. Overall, MC are suitable to be used as raw materials of film food packaging and RPO can be used as the substitute of the sorbitol to incorporate with MC.

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TABLE OF CONTENTS

AUTHOR'S DECLARATION	i
ABSTRACT	iv
ACKNOWLEDGEMENT	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF SYMBOLS	x
LIST OF ABBREVIATIONS	xi
LIST OF NOMENCLATURE	xiii
CHAPTER ONE INTRODUCTION	14
1.1 Research Background	14
1.2 Problem Statement	15
1.3 Objectives	16
1.4 Scope of Study	16
1.5 Significant of studies	17
CHAPTER TWO LITERATURE REVIEW	18
2.1 Food packaging	18
2.2 Cellulose for bio-based film packaging	20
2.3 MC polymer	21
2.3.1 Synthesis and properties of MC	21
2.3.2 MC film preparation	23
2.3.3 Trends in MC based materials	26
2.3.4 MC as packaging material	27
2.4 MC plasticized films	28
2.4.1 Plasticizers for film food packaging	28
2.4.2 Cellulose incorporated with plasticizers	30

CHAPTER ONE

INTRODUCTION

1.1 Research Background

Food industry is growing from time to time. Hence, the demand of the bio-based food packaging increases due to the concerns on food safety as well as the awareness towards the environmental issue. Food packaging helps in extending the shelf life of the food and provides the physical barrier between the food and outside environment, which may cause the food to be spoiled. The advantages of using bio-based food packaging are biodegradable, renewable and usually edible (Piñeros-Hernandez, Medina-Jaramillo, López-Córdoba, & Goyanes, 2017). Film food packaging can be in various forms such as films, plastics, trays and foamed products. The most commonly used bio-based polymers, as food packaging are polyhydroalkanoates (PHAs), polylactide (PLA), starch blends and other cellulose derivatives blends.

The raw materials of edible film food packaging are usually natural based, which are polysaccharide and protein based. Cellulose derivatives are one of the polysaccharides based that often used to make edible films food packaging due to its excellent ability in film forming, low cost and large availability such as chitosan and methylcellulose (MC). The examples of protein-based film packaging are whey protein, soy protein and corn zein. The polysaccharide-based packaging are highly hygroscopic and can be applied as thick films on the food surface to avoid the moisture loss from the food (Cazón, Velazquez, Ramírez, & Vázquez, 2017). Both polysaccharide and protein based food packaging have effective barrier to gas transference such as oxygen and carbon dioxide. This will help in delaying the loss of organic vapours during the storage. In terms of mechanical properties, the polysaccharides and protein based are not good enough to be compared to the synthetic polymer but the properties can be improve by adding the plasticizers.