EFFECT OF POLYVINYLPYRROLIDONE ON BIODEGRADABLE FILM DERIVED FROM CHITOSAN- POLY(VINYL ALCOHOL) FOR PLASTIC PACKAGING APPLICATION

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ABTSRACT

Plastic waste disposal has become a very serious problem because of its high volume of solid waste and takes a very long period of times to decompose because it was made up from non-biodegradable synthetic polymer. Blending of natural polymer and synthetic polymer is one of the options to reduce the time of decomposition. Various study of blending of chitosan with PVA is conducted in the past to overcome this issue. It shows that the blended film of chitosan and PVA have good film forming properties. In this study, it covers the effects of addition of PVP into those blended film. PVP is synthetic polymer that also has good film forming properties. Plastic film is prepared by using different ratio of chitosan-PVA with addition of different concentration of PVP solution. The plastic films were subject to mechanical property testing using testing machine. It was found that the addition of PVP does improve the properties of the chitosan in terms of mechanical properties. Swelling test and FTIR Analysis was conducted to determine the chemical nature of film and to determine the functional group of the plastic films. The swelling test of plastic film was carried out to determine the degree of swelling of the plastic polymers. From this study, it showed that the addition of PVP does increase the mechanical properties of the plastic films. The tensile strength and elongation at break of the plastic film increase as the addition of PVP concentration increase. The swelling test of the plastic films indicates that as the PVP concentration increase, the degree of swelling also increase.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

The redundant of non-biodegradable plastic in this world has grown concern from all sides. Most plastics are derived from polyethylene, polypropylene, polystyrene, poly(vinyl chloride) and poly(ethylene terephthalate) which are non-biodegradable material. A very long period of time are require in order to decompose this material; up to 1000 years or maybe more has bring worry from all people as it involving environmental concern and bring impact to health. Non-biodegradable material cannot be easily broken down is the main reason it takes a very long times to decompose. So, a solution must come in order to replace the non-biodegradable plastics into plastics that are derived from biodegradable polymers. Biodegradable polymer can reduce the environmental pollution as it will lower the amount of solid waste at the landfill. So, the use of natural polymer in manufacturing edible or biodegradable material for packaging has greatly increased. For examples: protein, lipids, and polysaccharides (cellulose, starch and chitin/ chitosan).

The existence of natural polymers in this world has grown interest in the development of various fields over the past two years mainly because of their abundance, environmental concerns and also due to the depletion of petroleum resources (Esam Abdulkder, 2014). Among natural polymers that exist in the earth, chitosan is one of the most ubiquitous natural polymers as it is considered as most abundant polymer behind cellulose. Chitosan, (1, 4)-[2amino-2-deoxy-β-D-glucan] is a natural biopolymer, obtained by a partial deacetylation of chitin. Structure of chitosan is almost similar with cellulose only with the addition of the hydroxyl groups on the second carbon atom.

Chitosan is types of polysaccharides that are very useful in broad range of applications including medical, pharmaceutical, chemical, agricultural and environmental fields. This has grown a lot of interest in the development of the characteristics of the chitosan. Chitosan is a natural polymer that has unique properties which are