CHARACTERIZATION AND PROPERTIES OF WATER HYACINTH FIBER REINFORCED TAPIOCA STARCH FOR FOOD PACKAGING APPLICATIONS

NURUL IZZATI BINTI FAUZI

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 2023

This Final Year Project Report entitled "**Characterization and Properties of Water Hyacinth Fiber Reinforced Tapioca Starch for Food Packaging Applications**" was submitted by Nurul Izzati binti Fauzi 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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Ts. Dr. Siti Nor binti Din
Supervisor
Senior Lecturer of Polymer Technology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Siti Nurlia binti Ali
Project Coordinator
Lecturer in Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Nur Nasulhah binti Kasim
Head of Programme
Senior Lecturer of Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Date:_____

ABSTRACT

CHARACTERIZATION AND PROPERTIES OF WATER HYACINTH FIBRE REINFORCED TAPIOCA STARCH FOR FOOD PACKAGING APPLICATIONS

Tapioca starch is one of a biodegradable material that have been used in the food packaging applications. Due to their lower price and renewability, they have been used to replace the synthetic plastic, which gives bad effect to the environment. However, biodegradable tapioca starch compounds still show some limitations. The solubility and mechanical properties of tapioca starch are poor. Thus, it is important to improve the tapioca starch film by reinforcing it with water hyacinth fiber (WHF). The characteristic of WHF and packaging film was analyzed using FTIR while the mechanical properties was evaluated using tensile test. The physical properties in terms of swelling, solubility and density also were observed. For FTIR, the cellulose biofilm of WHF and tapioca starch increased at the peak of 1414 cm^{-1} which create a strong biofilm. The tensile strength and young modulus had significantly increased with additions of WHF meanwhile elongation at break decreased that show the biofilm has a higher stiffness and rigidity. The biofilms had the high capacity to absorb water, thus when submerged in distilled water the films swelled rather than submerged in methanol and chloroform. Next, the solubility of the film loadings at 7 phr decreased from 12.74% to 12.14% as the larger fiber size of water hyacinth film samples had outstanding water stability. The density of the film was decreased as the fiber content increased. The optimum loading WHF was found to be 5 phr which provided good mechanical and physical properties. As a food packaging, WHF in tapioca starch will produce biodegradable film that environmentally friendly and can benefit the plant that have been discarded due to its bad effect to the aquatic environment. Therefore, WHF has been successfully reinforced tapioca starch for food packaging applications.

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