

UNIVERSITI TEKNOLOGI MARA

**EFFECT ON BIODEGRADABILITY OF LDPE FILM
INCORPORATED WITH VARIOUS LOADING OF
POTATO STARCH**

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Thesis submitted in fulfillment
of the requirement for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of University Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under Graduate, University Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

In current economic development, plastic is used due to its low cost, ease of manufacture, versatility, incapable of being penetrated by water and lightweight. However, the struggling in decomposition of the conventional plastics will cause a build-up in a soil, lakes and ocean and affecting the ecosystem and created environmental problem. The demand for the biodegradable plastics has increase daily since it is used as a sources of packaging and storage. In this study, potato starch was used as a biodegradable filler and was blended with Low Density Polyethylene (LDPE) by using melt mixer machine and extrusion blow film machine to produce the LDPE/Potato Starch (PS) films. In order to increase the compatibility between LDPE and potato starch, glycerol is added which also affect the brittleness of the film. LDPE/PS film of different composition of potato starch, 5% and 10% were prepared and compared with commercialize raw LDPE film. The mechanical and water absorption studies of LDPE/PS films have been done by tensile machine as per ASTM D882 and water absorption test as per ASTM D750-98 respectively. The biodegradability test and Differential Scanning Calometry (DSC) were done on the film to study the biodegradability and thermal properties, respectively. ATR-FTIR analysis has shown the characteristic absorbance of infrared toward raw LDPE and LDPE/PS blend films. The mechanical properties such as tensile and elongation at break shows decreasing pattern from 142.74 MPa to 59.71 Mpa for tensile strength and 1018.67% to 781.81% for elongation at break, respectively as the starch content increase from 0% to 10%. The water absorption test shown increasing pattern from 0.48% to 1.62% as the starch content increase. However, biodegradability of the films increased from 0.45% to 0.47% respectively based on the weight loss of the LDPE/PS film as the starch content increased. The ATR-FTIR analysis shown the essential peak for the potato starch in the LDPE matrix is observed at 1077cm^{-1} to 1150cm^{-1} and 3292.70cm^{-1} from the graph. The result of 10% amount of potato starch content in LDPE matrix promote good mechanical and degradability characteristic and it also have a similar performance of raw LDPE films. Because of that, the 10% amount of potato starch content is a optimize composition to be corporate with raw LDPE compared to others. Thus, the film produced can be used to replace the conventional plastic packaging.

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