BIODEGRADATION OF PALM-BASED POLYURETHANE FILLED WITH CELLULOSE BY USING *Bacillus subtilis*

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JULY 2016

This final Year Project Report entitled "**Biodegradation of Palm-based Polyurethane Filled with Cellulose by Using *Bacillus subtilis*"** was submitted by Hanis Ahmad, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences and was approved by

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ABSTRACT

BIODEGRADATION OF PALM-BASED POLYURETHANE FILLED WITH CELLULOSE BY USING *Bacillus subtilis*

The degradation ability of *Bacillus subtilis* to degrade Palm-based polyurethane foam filled with cellulose (PU-CEL) was evaluated by reacting monoester-OH from palm-kernel oil and isocyanate with ratio 1:1. Addition of microcrystalline cellulose in PU systems was at 0 %, 20 % and 40 % by weight, mixed using the mechanical stirrer. Rate of biodegradation of PU-CEL foam was measured by calculation of weight loss and FTIR analysis. The weight loss of PU-CEL of 0 %, 20 % and 40 % of PU-Cel foam was taken after week 4 and week 8. The results showed differences of 2.06 %, 3.00 % and 3.12 % from its initial weight. The IR spectra analysis shows the loss of peaks from ester functional group (-N-CO-O-). The morphological surfaces of PU-Cel foam were analyzed at 20x and 50x magnifications using digital microscope. Limewater test was used to determine the presence of carbon dioxide when the PU-CEL foam was digested by the *Bacillus subtilis*. The clear limewater turned cloudy indicating the presence of carbon dioxide. This study provides the evidence on how the susceptibility of cross-linked polymer over degradation can be tailored by substituting the petroleum-based polyol to palm-based polyol and the addition of suitable biodegradable filler such as cellulose.