

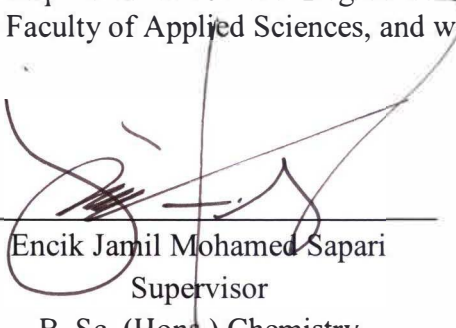
**SYNTHESIS OF RIGID POLYURETHANE FOAMS FROM SOYBEAN OIL  
BASED POLYOL**

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**Final Year Project Report Submitted in  
Partial Fulfilment of the Requirements for the  
Degree of Bachelor of Science (Hons.) Chemistry  
in the Faculty of Applied Sciences  
Universiti Teknologi MARA**

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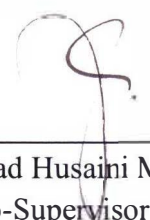
This Final Year Project entitled “**Synthesis of Rigid Polyurethane Foams from Soybean Oil-based Polyol**” was submitted by Nor Syazana binti Abu Hanifah, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by



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## ABSTRACT

### SYNTHESIS OF RIGID POLYURETHANE FOAMS FROM SOYBEAN OIL-BASED POLYOL

The study is carried out to produce and characterize rigid polyurethane foams from soybean oil. Rigid polyurethane (PU) foams have been prepared from soybean oil-based polyol and were synthesized by using two-step continuous routes which is epoxy-ring opening followed by alcoholysis process using sulphuric acid as a catalyst. Polyol is identified from hydroxyl functional group using Fourier Transform Infrared Spectroscopy (FTIR) and characterized by acid value. The obtained soybean oil-based polyol was reacted with polymeric diphenylmethane diisocyanate in the presence of water (blowing agent) in a system at NCO/OH ratio of 70/50, 60/50, 50/50 and 40/50 to produce different rigid polyurethane foams. The changes and effects of different NCO/OH ratio on foam properties were studied. Foam rise time and other mechanical properties such as hardness test were evaluated. It was found that the optimum mechanical properties of foams achieved with increasing the NCO/OH ratio. Optical microscopy was used to study the morphology to reveal the cell nature. The cells of all foams showed almost similar closed-cell appearance in microstructure. However, the foams were found to have large cell structure as NCO/OH ratio decreases as it explained a network separation occur during the foam expansion and not homogeneously reacted.