

## **Synthesis and characterization of polyols from refined cooking oil for polyurethane foam formation**

### **Abstract**

In this study, synthesized polyols from refined cooking oil, one of the ingredients in producing polyurethane (PU) foam, were investigated. The effects of reaction time, pH and type of solvents used on the properties of the polyols were characterized by using gas chromatography mass spectrometry (GC-MS), Fourier transform infrared (FTIR) spectroscopy and gel permeation chromatography (GPC). Further studies were carried out by using the synthesized polyols in combination with other chemicals for PU foam formation. The characterizations of the PU foams were performed through chemical, morphological and thermal analyses. The results showed that the polyols were synthesized successfully from refined cooking oil by using epoxidation and the hydroxylation process. 50% of the unsaturated fatty acids in the refined cooking oil were converted to saturated fatty acids and hydroxyl compounds as the reaction time increased up to five hours. However, the chemical contents in the polyols did not show significant changes as the pH value increased from pH3 to pH7. Using different types of solvent in the process showed that the hydroxyl content of the polyols ranged between 57 to 69 mg KOH/ g, with  $M_w$  in the range of 15325 to 19320 g mol<sup>-1</sup>. The results also revealed that not all the synthesized polyols were suitable for PU foam formation. It is recommended in this study that the minimum hydroxyl content and molecular weight of the synthesized polyol required for PU foam formation is 69 mg KOH/ g and 19320 g mol<sup>-1</sup> respectively. The properties of PU foam are highly dependent on the polyol and the water (blowing agent) content.