

## **Structure-property studies of thermoplastics and thermosetting polyurethanes using palm and soya oils-based polyols**

### **ABSTRACT**

Palm and soya oils were converted to monoglycerides via transesterification of triglycerides with glycerol by one step process to produce renewable polyols. Thermoplastic polyurethanes (TPPUs) were prepared from the reaction of the monoglycerides which act as polyol with 4,4'-methylenediphenyldiisocyanate (MDI) whereas, thermosetting polyurethanes (TSPUs) were prepared from the reaction of glycerol, MDI and monoglycerides in one pot. Characterization of the polyurethanes was carried out by FT-IR, <sup>1</sup>H NMR, and iodine value and sol-gel fraction. The TSPUs showed good thermal properties compared to TPPUs as well as TSPUs exhibits good properties in pencil hardness and adhesion, however poorer in flexural and impact strength compared to TPPUs. The higher percentage of cross linked fraction, the higher degree of cross linking occurred, which is due to the higher number of double bond presents in the TSPUs. These were reflected in iodine value test as the highest iodine value of the soya-based thermosetting polyurethanes confirmed the highest degree of cross linking. Polyurethanes based on soya oil showed better properties compared to palm oil. This study is a breakthrough development of polyurethane resins using palm and soya oils as one of the raw materials.

**Keyword:** Monoglyceride; Palm oil; Polyurethane; Soya oil; Thermoplastic; Thermosetting.