

## Synthesis of radiation curable palm oil-based epoxy acrylate: NMR, FTIR spectroscopic investigations

### ABSTRACT

Over the past few decades, there has been an increasing demand for bio-based polymers and resins in industrial applications, due to their potential lower cost and environmental impact compared with petroleum-based counterparts. The present research concerns the synthesis of epoxidized palm oil acrylate (EPOLA) from an epoxidized palm oil product (EPOP) as environmentally friendly material. EPOP was acrylated by acrylic acid via a ring opening reaction. The kinetics of the acrylation reaction were monitored throughout the reaction course and the acid value of the reaction mixture reached 10 mg KOH/g after 16 h, indicating the consumption of the acrylic acid. The obtained epoxy acrylate was investigated intensively by means of FTIR and NMR spectroscopy, and the results revealed that the ring opening reaction was completed successfully with an acrylation yield about 82%. The UV free radical polymerization of EPOLA was carried out using two types of photoinitiators. The radiation curing behavior was determined by following the conversion of the acrylate groups. The cross-linking density and the hardness of the cured EPOLA films were measured to evaluate the effect of the photoinitiator on the solid film characteristics, besides, the thermal and mechanical properties were also evaluated.

**Keyword:** FTIR; NMR; UV-curing; Epoxy acrylate; Palm oil