

## Physico-chemical characterisation of epoxy acrylate resin from jatropha seed oil

### ABSTRACT

**Purpose:** This paper aims to demonstrate the synthesis of polyesterification reaction of non-edible jatropha seed oil (JO) and acrylic acid, which leads to the production of acrylated epoxidised-based resin. To understand the physico-chemical characteristics when synthesis the JO-based epoxy acrylate, the effect of temperature on the reaction, concentration of acrylic acid and role of catalyst on reaction time and acid value were studied. **Design/methodology/approach:** First, the double bond in JO was functionalised by epoxidation using the solvent-free performic method. The subsequent process was acrylation with acrylic acid using the base catalyst triethylamine and 4-methoxyphenol as an inhibitor respectively. The physico-chemical characteristics during the synthesis of the epoxy acrylate such as acid value was monitored and analysed. The formation of the epoxy and acrylate group was confirmed by a Fourier transform infrared spectroscopy spectra analysis and nuclear magnetic resonance analysis. **Findings:** The optimum reaction condition was achieved at a ratio of epoxidised JO to acrylic acid of 1:1.5 and the reaction temperature of 110°C. This was indicated by the acid value reduction from 86 to 15 mg KOH/g sample at 6 hours. **Practical implications:** The JO-based epoxy acrylate synthesised has a potential to be used in formulations the prepolymer resin for UV curable coating applications. The JO which is from natural resources and is sustainable raw materials that possible reduce the dependency on petroleum-based coating. **Originality/value:** The epoxidised jatropha seed oil epoxy acrylate was synthesised, as a new type of oligomer resin that contains a reactive acrylate group, which can be alternative to petroleum-based coating and can used further in the formulation of the radiation curable coating.

**Keyword:** Chemical properties; Coating; Epoxy resins; FTIR spectroscopy; Synthesis; Natural resources