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Epoxy resin blends and composites from waste vegetable oil

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Abstract

Thermosets and composites were prepared from blends of epoxidized waste vegetable oils and diglycidylether of bisphenol-A to investigate this material as an alternative triglyceride source for epoxy resins. Purification of the waste oil was developed to remove impurities derived from thermal degradation in the frying process and different epoxidation methodologies were investigated. Effects of epoxidized vegetable oil content (up to 30 wt %) and origin on the tensile properties were studied and revealed that purified waste oils performed similarly to neat oil in contents up to 10 wt %, proving that this strategy does not compromise tensile properties when waste oils are used in suitable proportions. Furthermore, a more prominent plasticizing effect was observed when more than 15 wt% of bio-based resin was used as confirmed by DMA. Composites were prepared with recycled carbon fibres (up to 30 wt %) and thermosets with 10 wt% of bio-based epoxy resins, significantly improving the mechanical properties.

Keywords: Biopolymers, Thermosetting resins, Material testing, Vegetable oil.

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