An Evaluation of the Impact of Epoxidized Neem Seed Azadirachta indica Oil on the Mechanical Properties of Polystyrene

Authors : Salihu Takuma

Abstract : Neem seed oil has high contents of unsaturated fatty acids which can be converted to epoxy fatty acids. The vegetable oil – based epoxy material are sustainable, renewable and biodegradable materials replacing petrochemical – based epoxy materials in some applications. Polystyrene is highly brittle with limited mechanical applications. Raw neem seed oil was obtained from National Research Institute for Chemical Technology (NARICT), Zaria, Nigeria. The oil was epoxidized at 60 0C for three (3) hours using formic acid generated in situ. The epoxidized oil was characterized using Fourier Transform Infrared spectroscopy (FTIR). The disappearance of C = C stretching peak around 3011.7 cm-1and formation of a new absorption peak around 943 cm-1 indicate the success of epoxidation. The epoxidized oil was blended with pure polystyrene in different weight percent compositions using solution casting in chloroform. The tensile properties of the blends demonstrated that the addition of 5 wt % ENO to PS led to an increase in elongation at break, but a decrease in tensile strength and modulus. This is in accordance with the common rule that plasticizers can decrease the tensile strength of the polymer.

Keywords : biodegradable, elongation at break, epoxidation, epoxy fatty acids, sustainable, tensile strength and modulus
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