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## Mechanical and thermal properties of electron beam-irradiated polypropylene reinforced with Kraft lignin

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### Abstract

Polypropylene reinforced with Kraft lignin composites (0, 2.5, 5.0 and 10.0 wt% lignin) were submitted to electron beam (EB) irradiation at doses of 0, 50, 100 and 250 kGy. Kraft lignin incorporation maintained Young's modulus values, even at electron beam doses up to 100 kGy (10 wt% lignin). The yield stress losses were also reduced by the addition of lignin to polypropylene. Fourier transform infrared spectroscopy (FTIR) results showed low formation of carboxyl and hydroxyl groups for composites containing lignin. Dynamic mechanical analysis (DMA) curves indicated a synergistic effect between Kraft lignin and electron beam irradiation on the storage modulus ( $E'$ ). Several properties evolved as a function of the Kraft lignin content. Synergistic effects between Kraft lignin incorporation and electron beam radiation contribute to applications that require the mechanical and thermal properties of iPP to be maintained, even after high doses of electron beam radiation.

Keywords: polypropylene; Kraft lignin; composites; antioxidant effect; ionizing radiation

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