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Comparative study of effect of ionizing radiation on composites of wood flour in polyethylene and polypropilene matrixes using barium titanate as coupling agent

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The aim of this work was to study the effects of ionizing radiation on the properties of wood flour composites in polyethylene and polypropilene matrixes, using barium titanate as a coupling agent. The investigated compositions consisted of polyethylene/wood flour with barium titanate and polypropylene/wood flour with barium titanate using different wood flour concentrations of 10%, 15% and 30%. Subsequently, the samples were molded by injection, irradiated and submitted to thermal and mechanical tests. The mechanical properties (hardness, impact strength and melt flow index (MFI)), as well as the thermal properties (thermal distortion temperature and Vicat softening temperature) of the composites, non irradiated and irradiated were determined. The samples were irradiated in irradiation doses of 10 kGy and 20 kGy in an electron accelerator. Regarding the mechanical properties of non-irradiated samples, the incorporation of wood flour to polyethylene, resulted in a decrease of impact strength, tensile strength and melt flow index as well as an increase in hardness and HDT, showing that the wood flour no acts like a reinforcement agent but a biodegradable filler. There is not change of Vicat softening temperature. As in the irradiated samples, it was observed a decrease in the impact strength, tensile strength, HDT, and thermal distortion temperature and an increase in the hardness and tensile strength. The Vicat softening temperature were unchanged. Regarding the mechanical properties of non-irradiated samples, the incorporation of wood flour to polypropylene, resulted in a decrease of impact strength, melt flow index and an increase in hardness and in the tensile strength, showing that the wood flour acts like a reinforcement agent. As to the irradiated samples, it was observed a decrease in the impact strength, hardness and thermal distortion temperature and an increase in the tensile strength and Vicat softening temperature.

Keywords: PE and PP composites, wood flour, barium titanate, ionizing radiation.