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NEW POLYPROPYLENE / TRITICALE FIBER COMPOSITES: INTERRELATION BETWEEN COMPOSITION AND PROPERTIES

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ABSTRACT

This paper discusses the relationship between compositions and properties of polypropylene / triticale-natural fiber composites. Polypropylene / triticale composites were prepared by twin-screw extrusion process and injection molding. Regarding the appropriate way to feed natural fibers into the process, a pre-extrusion step is necessary because natural fibers are fluffy and hard to feed in this shape without compromise the consistency of fibers flow rate. A special pelletizing step of fibers was added prior to composites extrusion step. The effects of triticale content, the presence of maleic anhydride grafted polypropylene (PP-g-MA) as coupling agent and of CaO as reactive additive in the formulation on composites properties are discussed. The obtained composites were characterized in terms of morphology and microstructure, rheology, thermal and mechanical properties. The morphological observations show that a good dispersion of triticale fibers in polypropylene can be achieved and an increase in polymer/fiber adhesion at the addition of coupling agent can be obtained. Composite viscosity and mechanical properties were increased with triticale content up to 40 % volume of fibre. Mechanical properties were further improved in the presence of PP-g-MA and CaO. The tensile strength was continuously increased from 32.5 MPa up to 44.4 MPa when triticale content increases from 10 % at 40% for the composites formulated with PP-g-MA and CaO. The same trend was observed concerning the flexural properties. The recycling behavior and the flammability of composites are also disclosed. The results demonstrate that triticale fibers are a good reinforcement with a great potential in thermoplastic composites field if the processing procedure and formulation are appropriate.