RECYCLED POLYETHYLENE/LINEN YARN PRODUCTION WASTE COMPOSITES - CHANGES OF PROPERTIES AFTER WATER SORPTION

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Many composite scientists believe natural vegetable fibers (NVF) are an objects with great opportunity for composite materials processing. Composites thermoplastic polymer/NVF are objects of lot of investigations due to the flexibility during manufacturing and ability to recycling. Reasonable specific strength and stiffness, low mass and price are atractive properties of such composites.

One of the disadvantages of NVF containing composite materials is their low water resistance. The presence of hydroxyl groups in the main constituents (cellulose, hemicellulose and lignin) of fibers causes forming of large amount of hydrogen bonds with water which induce their swelling and weakening of composites [1].

To build composites with necessary properties modification of the fiber and/or polymer matrix is important factor. Investigations of systems containing polyethylene and linen yarn production waste (LW) show that modification of virgin low density polyethylene (LDPE) and recycled polymer (RPE) with diphenylmethane diisocyanate (DIC) gives considerable increase of composites physico-mechanical properties [2,3] and thermal stability [4]. At the same time water sorption ability diminishes [4]. Results about water sorption influence on properties of the composites RPE/LW are presented in this paper.

Study of water sorption kinetics of RPE/LW composites showes that systems with low filler content reach water sorption equilibrium values after 30 days and as in previous investigations [4] increase with LW content in composites. Water sorption level of composites with RPE don't differ from composites with virgin LDPE. Modification of composite materials with DIC reduce water influence on composites properties. For optimal composite [2,3] RPE/LW 40 wt.-% with DIC 3 wt.-% tensile modulus diminution after water sorption is 38 % (in comparison composite without modifier 51 %).

References

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RECIKLÇTA POLIETILÇNA UN LINU PAVEDIENU RAÞOÐANAS ATKRITUMU KOMPOZÎTI - ÎPAÐÎBU MAIÒA PÇC ÛDENS SORBCIJAS

Reciklçta polietilçna (RPE) un linu pavedienu raþoðanas atkritumu (LW) kompozîtu pçtîjumi parâda, ka to sorbçtâ ûdens daudzums praktiski neatðíiras no analoìiskâm sistçmâm, kuru veidoðanai lietots pirmçjais zema blîvuma polietilçns. Lîdzsvara stâvoklî saistîtais ûdens daudzums pieaug ar LW saturu kompozîcijâs. Modifikâtors difenilmetândiizocianâts (DIC) uzlabo kompozîtu ûdens izturîbu. Optimâlâ sastâva RPE/LW 40 % bez modifikâtora elastîbas modulis pçc ûdens sorbcijas samazinâs par 51 %, ar modifikâtoru - par 38 %.

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