

RECYCLING OF TETRA-PAK CARTON AND POLYETHYLENE TETRAPAK KARTONA UN POLIETILĒNA RECIKLĒŠANA

M.Coneva, A.Viksne

Riga Technical University, Faculty of Material Science and Applied Chemistry

The recycling of the beverage tetrapak shows one increasing interest for both an environmental point of view and valorisation of residue with high value.

The high percentage of carton (as well as the high quality of cellulose) makes this product of great interest for production of natural fiber containing composites.

The development of the cellulose fiber filled PE or PP will satisfy two demands the utilization of both discarded carton and recycled polymer.

We propose to use Tetrapak carton as a source of cellulose fiber for natural fiber filled composites on the base of the recycled Tetrapak PE as virgin PE.

The blending of materials was done at 150-170 C in a two-roll mill of Burnbury mixer, using modifiers.

The tensile strength, flexural strength and modulus notched and unnotched charpy impact strength were measured depending on filling degree and formulation of the composites.

It was shown increase of all strength parameters of both recycled or virgin PE depending on the content of cellulose fiber compare to un-filled polymer.

Table Mechanical strength parameters of cellulose fiber filled polyethylene

| Material | σ_{max} MPa | Σ , % | Flexural strength, MPa | Flexural modulus, MPa | Impact strength, KJ/m ² |
|--------------|-----------------------|--------------|------------------------------|-----------------------------|--|
| HDPE | 44.0 | 0,68 | | 950 | 16,5 |
| HDPE+40%TP-2 | 27.2 | 7,0 | 68,8 | 3066 | 15,5 |
| LDPE+40%TP-2 | 25.6 | | | | - |
| OPE+40%TP-2 | 44.0 | 14,0 | 47,2 | 1880 | - |

| Material | E_{SA} MPa | Tensile strength Mpa |
|--------------|-----------------|----------------------|
| HDPE | | 23 |
| HDPE+40%TP-2 | 1614 | 41 |
| LDPE+40%TP-2 | 839 | |
| OPE+40%TP-2 | 743 | 32,3 |

OPE- second hand PE

Referent: Mairita Coneva, Stendera str. 14-1A, tel. 63 11 383. mconeva@inbox.lv