

The influence of linear low density polyethylene on the properties of polyethylene blends

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Abstract

The work is devoted to the development of mixed polyethylene compositions for the production of films with improved physical and mechanical properties used for group packaging of goods. This article provides data on the influence of addition of linear low density polyethylene (LLDPE) on the properties of low density polyethylene (LDPE)-based composition polymer films. The major parameters of the mixtures were measured, namely melt flow index, softening temperature, melt viscosity, degree of crystallinity, tensile strength, elongation, thermal stability. The most suitable temperature of processing and optimal compositions' ingredients' shares were estimated.

Polyethylene types' choice was determined by the most appropriate physico-mechanical properties as well as production by Russian factories. Low density polyethylene, being the most widespread material in Russia, was selected as a mainstay whereas linear polyethylene was used as an additive. The latter demonstrates higher performance properties compared to low-density polyethylene as a result of certain length of its molecular chains and less branched architecture.

Polymer mixtures with 10%, 20% and 30% of linear polyethylene were investigated. Their physical and mechanical properties were tested. It was shown that the strength and performance properties of the mixtures increase correspondingly to the share of linear polyethylene. 180 °C was determined to be the optimum processing temperature for given compositions. The best strength properties were reached by adding of 30% of linear polyethylene. Adding of linear polyethylene in general up-regulates the softening temperature of the mixture as well as the melt flow index. It was also determined that as the mass content of linear polyethylene increases.

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