

Change of physical-mechanical properties of LD-PE foils

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LD-PE (low density polyethylene) is a flexible material with relatively low thermal and chemical resistance and impact resistance. At room temperature it is insoluble in most organic solvents. Its resistance to strong oxidizing acids is low. At higher temperatures it is more susceptible to attack by aromatic and chlorinated hydrocarbons. The use of LD-PE must allow for cracking and subsequent propagation of cracks in the material. LD-PE is mostly used for the production of plastic bags, foils, packaging materials for bulk goods such as building materials, tubing, bottles, washing powder bags, soil, fertilizers, detergent bottles, fabric softeners and shampoos. It has long been used as an insulating material. LD-PE is produced by blowing shrinkable film. The films themselves are colorless, odorless and tasteless. Polymer production is always associated with post-use recovery. Recycling is a growing challenge in the world because material waste is a major environmental and social problem for humanity and nature. PE and PET products are the most recycled plastic due to the short life of packaging materials. A wide range of new products can be produced from plastic waste, so plastic waste must be collected and recycled.

The experiment is based on real issues in the recycling of plastic waste in a world that is increasingly up to date. Refillcase is also coming up with the solution to the problem of plastic waste produced in all industries and its recycling. The technology is to produce returnable plastic bottles that can be used up to 50 times. LD-PE film is applied to the plastic bottles before filling with a specific medium. After the contents of the bottle have been consumed, the LD-PE film is stripped and thrown into the compost where the material is naturally distributed, thereby avoiding additional plastic waste or recycling the film. The film used is melted into granulate, processed and used for other applications. Subsequently, a new recyclable film is applied to the bottles used and the process is repeated. Changes in the properties of LD-PE films applied to these returnable bottles have been evaluated by several tests. The following tests were performed on the LD-PE films: tensile test, water absorption test and melting point determination. The tests were performed on unused LD-PE films (N) and on used LD-PE films (P), which were filled with the medium for 3 months - medium. The fill media was chosen from commonly available goods. Unused films were filled with disinfectant (S), detergent (SR) and Coca-Cola (C). Based on the tensile test results, the tensile strength increased in the longitudinal direction of the material. The highest value was recorded for the foil exposed in the disinfectant. The melting point of the LD-PE foil is in the range of 100 - 115 °C, which corresponds to the table values of the melting point of PE.

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