

Filled Polymer Composite

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Abstract : Polymers and polymer composites play vital roles in diverse industries, including food and beverage packaging, transportation innovations, and medical advancements. However, the advancements in polymer technology bring certain risks, particularly concerning water and soil pollution due to the presence of polymers. The creation of new polymers is a critical aspect of this field. While the primary focus is on improving their physical and chemical properties, ensuring their ecological compatibility is equally important. An advanced method for developing innovative polymer types involves integrating fillers with diverse characteristics, offering advantages such as cost reduction and improved quality indicators. In the conducted research, efforts were made to enhance environmental aspects by employing waste fillers. Specifically, low-density polyethylene (LDPE) was used as the polymer, and waste from cocoon factories was chosen as the filler. Following a process of cleaning, drying, and crushing the filler to specific dimensions, it was incorporated into polyethylene through a mechanical-chemical method under laboratory conditions. The varied rheological properties of the resulting polyethylene compositions examined at temperatures ranging from 145 to 165 degrees Celsius. These compositions demonstrated different rheological properties at various temperature intervals. Achieving homogeneity in the obtained compositions is crucial in the polymers mechanochemical process. Beyond rheological properties, swelling rates in different environments and percentages of mass loss at different temperatures learned using the differential thermal analysis method. The research revealed that, to a certain extent, the physico-chemical properties of polyethylene were not significantly affected by the polymer compositions. This suggests that incorporating cocoon waste enables cost reduction in composite production while positively impacting the environment.

Keywords : polyethylene, polymer, composites, filler, reology

Conference Title : ICPC 2024 : International Conference on Polymers and Composites

Conference Location : Istanbul, Türkiye

Conference Dates : January 29-30, 2024