

Preparation and physico-chemical study of fire retardant from chicken feathers and PP/PE composites

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Abstract. Chicken feathers were used to reinforce low density polyethylene (LDPE) and polypropylene (PP). The physico-mechanical and flame retardation properties of the composites were investigated. Properties such as tensile strength, elongation at break, flexural strength, and modulus as well as water absorbency were determined and the results obtained were analyzed. The composites were further characterized by SEM and FTIR analyses to study the surface morphology and evidence of composite formation respectively. The Young modulus of reinforced composites were greater than that of virgin samples. The fiber/Polypropylene samples were observed to have the highest value of Young modulus, with a value of 133.33 GPa, and tensile strength value of 16.93 MPa. TGA and flame retardant tests were carried out to investigate the flame propagation and thermal properties of the composites. The results showed that the mechanical properties of composites from polypropylene were better enhanced than those from the composites of polyethylene, with an overall increase in mechanical properties when compared to the virgin polymers used. From the TGA and flame retardant test, it was observed that the more the fiber load the more the formation of char layers in the samples, hence retards the flame formation and reduced prolonged burning and flame propagation.

Keywords: chicken feathers; flame retardant; tensile properties; water absorption.

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