

Thermogravimetric analysis properties of cellulosic natural fiber polymer composites: a review on influence of chemical treatments

ABSTRACT

Natural fiber such as bamboo fiber, oil palm empty fruit bunch (OPEFB) fiber, kenaf fiber, and sugar palm fiber-reinforced polymer composites are being increasingly developed for lightweight structures with high specific strength in the automotive, marine, aerospace, and construction industries with significant economic benefits, sustainability, and environmental benefits. The plant-based natural fibers are hydrophilic, which is incompatible with hydrophobic polymer matrices. This leads to a reduction of their interfacial bonding and to the poor thermal stability performance of the resulting fiber-reinforced polymer composite. Based on the literature, the effect of chemical treatment of natural fiber-reinforced polymer composites had significantly influenced the thermogravimetric analysis (TGA) together with the thermal stability performance of the composite structure. In this review, the effect of chemical treatments used on cellulose natural fiber-reinforced thermoplastic and thermosetting polymer composites has been reviewed. From the present review, the TGA data are useful as guidance in determining the purity and composition of the composites' structures, drying, and the ignition temperatures of materials. Knowing the stability temperatures of compounds based on their weight, changes in the temperature dependence is another factor to consider regarding the effectiveness of chemical treatments for the purpose of synergizing the chemical bonding between the natural fiber with polymer matrix or with the synthetic fibers.

Keyword: Chemical treatment; Natural fiber; Polymer composites; TGA; Thermal stability