

## **Effect of accelerated weathering on tensile properties of kenaf reinforced high-density polyethylene composites**

### **ABSTRACT**

In this study, a high-density polyethylene composite reinforced with kenaf (*Hibiscus Cannabinus* L.) bast fibres (K-HDPE) was fabricated and tested for durability with regard to weather elements. The material consists of 40% (by weight) fibres and 60% matrix. Other additives, such as ultraviolet (UV) stabiliser and maleic anhydride grafted polyethylene (MaPE) as a coupling agent were added to the composite material. The biocomposite was subjected to 1000 hours (h) of accelerated weathering tests, which consisted of heat, moisture and UV light, intended to imitate the outdoor environment. The tensile properties of the K-HDPE composite were recorded after 0, 200, 400, 600, 800 and 1000 h of exposure to the accelerated weathering. Compared with neat high-density polyethylene (HDPE), the K-HDPE composite has 22.7% lower tensile strength when produced but displays a less rapid rate of strength deterioration under weathering (After 1000 h of exposure the tensile strength of K-HDPE drops 29.4%, whereas, for neat HDPE, it falls rapidly by 36%). Due to better stiffness, the Young's modulus of the K-HDPE composite is much higher than that of neat HDPE. The fibres on the surface of the K-HDPE composite gradually start to whiten after 200 h of exposure and become completely white after 600 h of exposure. For neat HDPE, micro-cracking on the surface can be observed after 200 h of exposure and the stress-strain curve obtained from the tensile test indicates its increase in brittleness proportional to the amount of weathering time.

**Keyword:** Kenaf bast fibre; High-density polyethylene; Tensile properties; Accelerated weathering; Natural fibre polymer composites