

Mechanical strength, thermal conductivity and electrical breakdown of kenaf core fiber/lignin/polypropylene biocomposite

ABSTRACT

Mechanical strength, thermal conductivity and electrical breakdown of polypropylene/lignin/kenaf core fiber (PP/L/KCF) composite were studied. PP/L, PP/KCF and PP/L/KCF composites with different fiber and lignin loading was prepared using a compounding process. Pure PP was served as control. The results revealed that tensile and flexural properties of the PP/L/KCF was retained after addition of lignin and kenaf core fibers. Thermal stability of the PP composites improved compared to pure PP polymer. As for thermal conductivity, no significant difference was observed between PP composites and pure PP. However, PP/L/KCF composite has higher thermal diffusivity. All the PP composites produced are good insulating materials that are suitable for building. All PP composites passed withstand voltage test in air and oil state as stipulated in IEC 60641-3 except PP/L in oil state. SEM micrograph showed that better interaction and adhesion between polymer matrix, lignin and kenaf core fibers was observed and reflected on the better tensile strength recorded in PP/L/KCF composite. This study has successfully filled the gap of knowledge on using lignin and kenaf fibers as PP insulator composite materials. Therefore, it can be concluded that PP/Lignin/KCF has high potential as an insulating material.

Keyword: Kenaf core fibers; Lignin; Polypropylene; Electrical breakdown; Thermal conductivity