

Comparative study of physical, mechanical, and thermal properties of sugar palm fiber (Arenga pinnata) reinforced vinyl ester composites obtained from different geographical locations

ABSTRACT

Sugar palm fibers (SPF) reinforced vinyl ester (VE) composites were prepared in this study. The SPFs were obtained from three different geographical locations: Kuala Jempol (Peninsular Malaysia), Tawau (West Malaysia), and Tasik Malaya (Indonesia). The SPFs were utilized as reinforcement material with a fixed loading of 10 wt.%. The reinforced VE composites were prepared using a wet lay-up compression moulding method. The physical properties examined were water absorption, thickness swelling, and moisture content. To determine the strength of the SPF composites, tests on the tensile, flexural, and impact strength related to mechanical properties were completed. A thermogravimetric analysis (TGA) was completed to observe the thermal properties. This study confirmed that the properties of the composites were affected by the strength of the fiber. The SPF/VE composites obtained from Kuala Jempol had the highest tensile, flexural, and impact strength compared to the SPF/VE composites from Indonesia and Tawau. In addition, SPF Jempol/VE also recorded the highest percentage of water absorption, thickness swelling, and moisture content. A comparison of thermal properties showed that SPF Tawau/VE had highest percentage of mass loss between fibers from the three geographic locations.

Keyword: Sugar palm fiber; Vinyl ester composites; Physical properties; Mechanical properties; Thermal properties