Title: Experimental Analysis of Flexural and Hardness Property of Palm-Sisal Reinforced Epoxy Resin Hybrid Composite Materials

By Melese Shiferaw

Abstract:

Hybrid Natural fiber composite material is made from two or more natural fibers for the purpose of getting better mechanical properties than single fiber composites. Ethiopian has much abundant of natural fibers like palm, sisal that can replace synthetic fiber composite materials. But in the past there is less attention on the studying of its property of these natural fiber for different application. In this study palm and sisal fiber used as reinforcement with epoxy resin as matrix to study and conduct the experimental test of flexural strength and hardness properties of the new hybrid composite material. The hybrid composite test specimens was prepared at different parameters. These parameters are sequence of fiber layers (palm-sisal-sisal-palm PSSP, palm-sisal-palm-sisal SPSP, and sisal-palm-palm-sisal SPPS), angle orientation of fibers (0_0-45_0- 0_0-45_0, 0_0-0_0-0_0-0_0, 0_0-90_0-0_0-90_0), weight concentration of fibers (weight ratio) and also by using 6% and 10% alkali (NaOH) treated type of fiber. The test was conducted by experimental methodology approach and the number of sample was three point sampling size. The test was investigated by using universal testing machine for flexural strength and Rockwell hardness tester for hardness test. From test result, the 6% NaOH treated chopped composites has a higher flexural strength (66 MPa.) with weight concentration of 5%palm-20%sisal- and 75% epoxy. And also from lamination type of orientation 6% treated fiber at 0_0-45_0-0_0-45_0 angle orientation has shown higher flexural strength (55MPa.). From the hardness test result higher hardness number obtained at 6% NaOH alkali-treated fiber with weight concentration of 5%palm, 20%sisal and 75% epoxy chopped fiber with hardness number 110.344 in HRA.

Further, the results of this study indicate that using hybrid fibers as reinforcement in polymer matrix could successfully develop a composite material property in terms of high strength to weight ratio and rigidity for light weight applications.

Keywords: hybrid, composite, flexural strength, matrix, hardness, Rockwell hardness tester.