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Investigating the Characteristics of Multi-Plastic Composites Prepared from a Mixture of Silk Fibers and Recycled Polycarbonate

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Abstract : In this research, the characteristics of composites prepared from waste silk fibers and recycled polycarbonate polymer (used compacted boards) at four levels of 0, 10, 20, and 30% (silk fibers) and using 2% N- 2-Aminoethyl-3-Aminopropyltrimethoxysilane was investigated as a coupling agent and melt process method. Silk fibers (carpet weaving waste) with dimensions of 8-18 mm were prepared, and recycled polymer with 9 mesh grading was ground. Production boards in 3 thicknesses, 3 mm (tensile test samples), 5 mm (bending test samples, water absorption, and thickness shrinkage), 7 mm (impact resistance test samples)) with a specific weight of 1 gram per cubic centimeter, hot pressing time and temperature of 12 minutes and 190 degrees Celsius with a pressure of 130 bar, cold pressing time of 6 minutes with a pressure of 50 bar and using the coupling agent N- (2- Aminoethyl)-3-aminopropyltrimethoxysilane was prepared in a constant amount of 2% of the dry weight of the filler. The results showed that, in general, by adding silk fibers to the base polymer, compared to the control samples (pure recycled polycarbonate polymer) and also by increasing the amount of silk fibers, almost all the resistances increased. The amount of water absorption of the constructed composite increased with the increase in the amount of silk fibers, and the thickness absorption was equal to 0% even after 72 hours of immersion in water. The thermal resistance of the pure recycled polymer was higher than the prepared composites, and by adding silk fibers to the base polymer and also by increasing the amount of silk fibers from 10 to 30%, the thermal resistance of the composites decreased.

Keywords : wood composite, recycled polycarbonate, silk fibers, polymer
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