

Effect of Extractives on Moisture Sorption and Shrinkage in Tropical Woods

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Abstract

Samples of sixteen tropical wood species from Indonesia were selected to undergo desorption and adsorption in the unextracted and extracted form. The anisotropic shrinkage values of these samples were also determined. At high humidities, the extracted woods exhibit higher equilibrium moisture contents than the unextracted woods. However, the isotherms of extracted and unextracted woods coincide at relative humidities below 70% for both desorption and adsorption. This phenomenon indicates that the hygroscopicity of wood is affected at high humidities through the extractives bulking the amorphous region in the cell wall. The shrinkage intersection point ranges from 18.0 to 34.1%, with an average of 24.8%, which is below the predicted 30% for temperate-zone woods. The linear relationship between volumetric shrinkage and specific gravity was significant, but the correlation ($r^2 = 0.40$) is quite low. The removal of extractives with hot water and organic solvents caused excessive shrinkage. All the woods tested showed partial collapse, indicating the plasticization of the extractives at high temperature and high moisture content in the cell wall structure.

Keywords

Extractives, desorption, adsorption, shrinkage, moisture, tropical woods, fiber saturation point