

Adhesion characteristics of phenol formaldehyde pre-preg oil palm stem veneers

ABSTRACT

The purpose of this study was to evaluate the adhesion properties of phenol formaldehyde-prepreg oil palm veneers that have potential for plywood manufacture. Phenol formaldehyde (PF) resin of three different molecular weights (i.e. 600 (low), 2,000 (medium), and 5,000 (commercial)) were used to pre-treat the veneers. The veneers were soaked in each type of PF resin for 20 seconds, pressed between two rollers, and pre-cured in an oven maintained at 103 ± 2 °C for 24 hours. The volume percent gain (VPG), weight percent gain (WPG), pH, buffering capacity, and contact angle of the phenolic pre-preg veneers were determined. The bonding shear was also evaluated according to British Standard European Norm BS EN 314. The results show that veneers from both inner and outer layers treated with low molecular weight PF (LMwPF) resin had significantly higher VPG and WPG compared to the other PF resins. The pH values of all of the veneers were slightly acidic (6.5 to 6.8) except for those that were treated with commercial molecular weight PF resin (7.8). A buffering capacity study revealed that untreated veneer had a greater resistance toward alkali, but was unstable under acidic conditions, while the phenolic pre-preg veneer behaved differently. This effect was more prominent as the molecular weight of the PF resin increased. An examination of the veneer surfaces demonstrated that phenolic treatment had increased the contact angle of the OPS veneer surfaces significantly. The bonding properties of plywood made from pre-preg palm veneers were found to be superior to those of commercial palm plywood.

Keyword: Oil palm veneer; Pre-preg; Phenol formaldehyde; Molecular weight; Weight percent gain; pH; Buffering capacity; Contact angle