

Mechanical performance of acetate lacquer from acacia mangium

ABSTRACT

Cellulose comprises about 40–50 % of the composition of wood, making it one of the most abundant organic polymers on earth. Cellulose is very versatile in terms of application, with a wide array of products fabricated, including the chemically modified cellulose derivatives. One of the more prominent and multifaceted derivatives is the cellulose acetate, in which have been used predominantly as cigarette filters, membrane filters, and coating. In this study, the intermediate product, Acacia mangium-produced cellulose acetate was modified into lacquer to produce a feasible wood coating product. The lacquer underwent a series of tests such as impact, abrasion, adhesion, and hardness to evaluate its mechanical performance. The results of the coating were compared to a similarly formulated acetate lacquer that was produced using commercial cellulose acetate instead as a control. Based on the result, it is shown that Acacia mangium-produced cellulose acetate lacquer shows a better impact resistance with a rating of 4 as opposed to the commercial cellulose acetate with a rating of 3 with moderate cracking, with an approximate 6% better abrasion resistance and higher hardness rating class. Meanwhile, the commercial cellulose acetate lacquer presents a better adhesion performance with only 5% flaking compared to the 15% flaking of Acacia mangium-produced cellulose acetate lacquer. The Acacia mangium-produced cellulose acetate lacquer indicates a novel benefit from the presence of impurities from the intermediate Acacia mangium-produced cellulose acetate product such as the plasticizing hemicellulose acetate, as well as the hydrophobic lignin.