Investigation of oil palm based Kraft and auto-catalyzed organosolv lignin susceptibility as a green wood adhesives

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Abstract

The aim of this study is to highlight the application and potentiality of oil palm based lignins in the synthesis of green phenolic resins. The delignification processes were conducted using Kraft and auto-catalyzed ethanol-water pulping processes. The extracted lignins were characterized using elemental analysis, Fourier transform-infrared, 1H and 13C nuclear magnetic resonance (NMR) spectroscopy, molecular weight distribution (Mn, Mw and polydispersity), thermogravimetric analysis (TGA), and differential scanning calorimetry (DSC). The obtained FTIR results revealed that the Kraft lignin contained substantial amounts of guaiacyl units with smaller amounts of syringyl units. The molecular weight of Kraft lignin was 1564 g mol−1 which is higher than organosolv lignin at 1231 g mol−1. The activated free ring position (2.99%) of Kraft lignin was comparatively higher than that of organosolv lignin (2.06%) which was measured using Mannich reactivity analysis. Thermal analysis of Kraft lignin showed higher thermal stability compared to organosolv lignin. The structural and thermal characteristics implied that Kraft lignin had higher potential for the production of green phenolic resins when compared with organosolv lignin.