

# Fungsionalisasi lignin sebagai coupling agent melalui poliuretanisasi graft polietilena glikol 4000 = Lignin functionalization for application as coupling agent through polyurethanization with grafting agent polyethylene glycol 4000

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## Abstrak

### <b>ABSTRAK</b><br>

kompatibiliser jenis baru berbasis poliuretan telah disintesis dan dikarakterisasi. Poliuretan kompatibeliser ini dipersiapkan melalui reaksi dua tahap, yaitu dengan mereaksikan isosianat metilenabis (sikloheksil isosianat) dan polioli polietilena glikol (PEG) berat molekul 4000 g/mol menghasilkan prepolimer, dilanjutkan dengan pencangkakan lignin. Efek dari komposisi lignin dan perbandingan isosianat : polioli terhadap kemampuan kompatibilitas, analisis termal, dan morfologi diinvestigasi melalui pengujian FT-IR (Fourier Transform Infra-Red Spectroscopy), <sup>1</sup>H NMR (Nuclear Magnetic Resonance), STA (Simultaneous Thermal Analysis), serta SEM (Scanning Electron Microscopy). Diketahui poliuretan dengan perbandingan isosianat : polioli 1:2 dan 1:4 menghasilkan poliuretan-lignin cangkak, ditandai dari pengujian FT-IR dan NMR. Sifat kompatibilitas bervariasi, dengan nilai segmen hidrofilik : hidrofobik masing-masing 0,2 dan 0,635. Morfologi cenderung kompatibel, dengan sedikit segregasi fasa hidrofobik dan hidrofilik. Sementara T<sub>g</sub> dari tiap produk berada di kisaran 60 oC dengan temperatur dekomposisi di kisaran 430 oC. Hasil yang didapat mengkonfirmasi potensi poliuretan tersebut sebagai agen kompatibeliser pada polyblend

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A new family of compatibilizer agent based on polyurethane (PU) were synthesized and characterized. PU have been prepared by two stages reaction. The polymer was prepared by reacting methylenebis cyclohexyl-isocyanate (HMDI) and polyethylene glycol (PEG) with molar mass of 4000 g/mole, then grafting by lignin. The effects of lignin composition and isocyanate/polyol contents on compatible ability, thermal properties, and morphology were investigated by FT-IR (Fourier Transform Infra-Red Spectroscopy), <sup>1</sup>H NMR (Nuclear Magnetic Resonance), STA (Simultaneous Thermal Analysis), and SEM (Scanning Electron Microscopy). The results of FT-IR and NMR shown that polyurethane with isocyanate : polyol 1:2 and 1:4 yield polyurethane-grafted-lignin. Variation of compatibility value with ratio of hydrophilic/hydrophobic 0.2 and 0.635 were obtained. The morphology tend to have micro-segregated phase of hydrophilic-hydrophobic content. Meanwhile T<sub>g</sub> of each product is on 60 oC with decomposition temperature of 430 oC. The results confirmed the potential of these polyurethanes as a new compatibilizer agent of polymer blends.

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