

Studi pengaruh suhu dan komposisi 4,4 metilenbis sikloheksil isosianat terhadap karakteristik hibrida biopolimer kompatibeliser berbasis lignin dan poliuretanan = The study of influence of temperature and composition 4 4 methylenebis cyclohexyl isocyanate to characteristics of hybrid kompatibeliser biopolymer based on lignin and polyurethane

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Abstrak

ABSTRAK

Lignin adalah salah satu biopolimer terbanyak di dunia. Lignin memiliki sisi polar dan non polar akibat struktur yang bercabang. Namun, berdasarkan penelitian sebelumnya, tendensi kepolaran lignin lebih besar dibandingkan kenonpolarannya. Lignin berpotensi sebagai kompatibeliser yang baik apabila kenonpolarannya dapat ditingkatkan. Penelitian ini bertujuan untuk mensintesis hibrida poliuretan berbasis lignin HPL untuk meningkatkan kenonpolaran lignin. HPL dihasilkan dari reaksi 4,4 39;- Methylenebis Cyclohexyl Isocyanate HMDI dengan variasi komposisi , PEG 6000 dan lignin. Variasi suhu ketika reaksi dengan lignin juga dilakukan dengan variasi 80 hingga 100 C. Struktur HPL dikomfirmasi menggunakan nuclear magnetic resonance spectroscopy NMR dan fourier transform infrared spectroscopy FTIR . Berdasarkan NMR dan FTIR, HPL berhasil dihasilkan. NMR juga digunakan untuk menghitung rasio kepolaran HPL. Berdasarkan NMR, rasio kepolaran HPL menurun dari 0,069 ke 0,041 seiring meningkatnya komposisi HMDI. Peningkatan kenonpolaran juga dikonfirmasi dengan tegangan permukaan hasil pengujian sessile drop. Tegangan permukaan HPL menurun seiring dengan meningkatnya komposisi HMDI dengan nilai tegangan permukaan terkecil adalah 46,4 nM/m. Sifat termal HPL juga diuji menggunakan STA. Berdasarkan STA, Td semakin meningkat seiring dengan meningkatnya komposisi dari HMDI dan suhu yang disebabkan oleh terbentuknya crosslinking. Nilai Td terbaik dimiliki oleh HPLE dengan nilai 417,6 C.

ABSTRACT

Lignin is one of the most abundant biopolymer on earth. It has polarity and non polarity side due to its hyperbranched structure, but the polarity of lignin has a higher tendency than non polarity. Lignin has potential to be compatibilizing agent if the portion of non polarity can be increased. This research is focused on investigation of synthesize lignin based polyurethane to enhance the portion of non polarity in lignin. Lignin based polyurethane was prepared by reacting 4,4 39 Methylenebis Cyclohexyl Isocyanate HMDI with variation compositions and polyethylene glycol PEG Mw 6000, then lignin was added to the reaction. The temperature of reaction for lignin also varied between 80 to 100 C. In this study, the structure of lignin based polyurethane was confirmed by nuclear magnetic resonance spectroscopy NMR and fourier transform infrared spectroscopy FTIR . NMR and FTIR showed that lignin successfully grafted. NMR, also used to investigated the effects of variation composition of diisocyanate contents to polarity of lignin based polyurethane. Based on NMR the ration p np decrease from 0.069 to 0,041 with the increasing of composition HMDI. The enhance of nonpolarity HPL also confirm by the value of surface tension from sessile drop. it show that the surface tension of HPL decline as the increasing of the compositon of HMDI. The best serface tension was from HPLE with 46.4 nM m. Thermal properties of lignin based polyurethane

also investigate using STA. The result was the increasing of thermal degradation of lignin based polyurethane as well as the increasing of composition HMDI and temperature condition, cause of the crosslinking in lignin. Td largest value is 417,6 C from HPLE