SINTESIS DAN KARAKTERISASI PEREKAT BAMBU LAMINAR MELALUI PROSES HIDROKSILASI DAN DEMETOKSILASI LIGNIN TERMEDIASI PELARUT EUTEKTIK BERBASIS SENG KLORIDA

SKRIPSI

diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Sains pada
Program Studi Kimia

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SINTESIS DAN KARAKTERISASI PEREKAT BAMBU LAMINAR MELALUI PROSES HIDROKSILASI DAN DEMETOKSILASI LIGNIN TERMEDIASI PELARUT EUTEKTIK BERBASIS SENG KLORIDA

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ABSTRAK

Lignin merupakan polimer aromatik dengan struktur bercabang terdiri dari subtituen hidroksil dan metoksil yang diharapkan dapat digunakan sebagai bahan perekat bambu laminar yang *biodegradable* dan ekonomis. Cairan ionik eutektik (EILs) yaitu campuran eutektik cair yang terdiri dari donor ikatan hidrogen (HBD) dan akseptor ikatan hidrogen (HBA) telah banyak digunakan dalam mengekstrak dan melarutkan lignin. Selam ini, perekat kayu umumnya disintesis menggunakan formaldehida yang berbahaya bagi kesehatan dan lingkungan. Penelitian ini bertujuan untuk mensintesis perekat bambu laminar menggunakan lignin termediasi pelarut eutektik berbasis seng klorida. Perekat diaplikasikan pada bambu untuk mengetahui nilai kekuatan bending dalam pengujian mekanik untuk memperoleh perekat bambu laminar berkinerja tinggi tanpa formaldehid. Sintesis perekat bambu laminar dilakukan dengan metode modifikasi lignin menggunakan pelarutan EILs dan fenol serta penambahan larutan polivinilpirolidon (K30) untuk menggantikan formaldehid. Terhadap perekat bambu laminar yang berhasil disintesis dilakukan studi FTIR, TGA dan diukur kekuatan mekaniknya menggunakan uji bending. Studi FTIR mengkonfirmasi pembentukan perekat lignin yang ditunjukkan dengan adanya gugus hidroksil fenolik yang berada pada intensitas puncak di daerah 3502-3417 cm^{-1} yang menjadi ciri telah terbentuknya ikatan hidrogen dan puncak di daerah 2931 dan 2947 cm^{-1} sebagai puncak karakterisasi dari gugus metoksi. Hasil TGA terhadap lignin yang termodifikasi menunjukkan stabilitas termal yang baik. Hasil uji mekanik terhadap besarnya kekuatan tekuk perekat bambu laminar adalah sebesar 40.46745 MPa. Modifikasi lignin menggunakan cairan ionik eutektik (EILs) dan fenol serta penambahan larutan K30 (50%) memiliki potensi untuk meningkatkan sifat mekanik dan memperoleh perekat bambu laminar yang bekinerja tinggi.

Kata kunci: cairan ionik eutektik (EILs); lignin; modifikasi; polivinilpirolidon (K30); uji bending

ABSTRACT

Lignin is an aromatic polymer with a branched structure consisting of hydroxyl and methoxyl subtituents that is expected to be used as a biodegradable and economical laminar bamboo adhesive. Eutectic ionic liquids (EILs), which are liquid eutectic mixtures consisting of hydrogen bond donors (HBD) and hydrogen bond acceptors (HBA), have been widely used in extracting and dissolving lignin. So far, wood adhesives are generally synthesized using formaldehyde, which is harmful to health and the environment. This study aims to synthesize a laminar bamboo adhesive using zinc chloride-based eutectic solvent-mediated lignin. The adhesive was applied to bamboo to determine the bending strength value in mechanical testing to obtain a high-performance laminar bamboo adhesive without formaldehyde. Synthesis of laminar bamboo adhesive was carried out by lignin modification method using dissolution of EILs and phenol and addition of polyvinylpyrrolidone solution (K30) to replace formaldehyde. The successfully synthesized laminar bamboo adhesives were subjected to FTIR, TGA studies and mechanical strength was measured using bending tests. FTIR studies confirmed the formation of lignin adhesives indicated by the presence of phenolic hydroxyl groups in the peak intensity in the 3502-3417 cm-1 region which characterizes the formation of hydrogen bonds and a peak in the 1033 cm-1 region as a characteristic peak of methoxy groups. TGA results of modified lignin showed good thermal stability. The mechanical test result of the bending strength of laminar bamboo adhesive was 40.46745 MPa. Lignin modification using eutectic ionic liquids (EILs) and phenol and the addition of K30 solution (50%) have the potential to improve the mechanical properties and obtain a high performance laminar bamboo adhesive.

Keywords: eutectic ionic liquids (EILs); lignin; modification; polyvinylpyrrolidone (K30); bending tes

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