PENGOLAHAN AWAL BIOMASSA BAGAS MENGGUNAKAN GARAM *FATTY IMIDAZOLINIUM* UNTUK MENIGKATKAN HIDROLISIS ENZIMATIK *SELULASE*

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Abstrak

Pengolahan awal biomassa bagas menggunakan garam *fatty imidazolinium* ditemukan cukup efektif untuk membantu proses hidrolisis enzimatik. Tujuan dari penelitian yang dilakukan adalah untuk mengetahui bagaimana kinerja cairan ionik garam *fatty imidazolinium* sebagai pelarut ionik pada proses pelarutan biomassa bagas. Tiga cairan ionik telah disintesis dan diuji sebagai pelarut menggunakan metoda pemanasan gelombang mikro. Tiga cairan ionik ini merupakan garam organik dari kation cis-oleil imidazolinium ($[c\text{-}OIm]^+$) dengan 3 jenis anion yang berbeda yakni Iodida ($[I]^-$), Tiosianat ($[SCN)^-$], dan Asetat ($[CH_3COO]^-$). Cairan Ionik disintesis mengikuti prosedur pada literatur. Pengolahan awal (proses pelarutan dan pengendapan kembali larutan selulosa menggunakan anti-solvent) menurunkan nilai indeks kristalinitas selulosa (57,43% menjadi 53,06%), mengubah struktur (selulosa I menjadi selulosa II), mengurangi ukuran partikel bagas (136,3 nm menjadi 68,9 nm) dan meningkatkan hasil glukosa pada hidrolisis enzimatik. Hasil glukosa selama 48 jam hidrolisis enzimatik sebesar 2,282 mg/mL (menggunakan [c-OIm]CH3COO) > 1,779 mg/mL (menggunakan [c-OIm]SCN) > 1,272 mg/mL (menggunakan [c-OIm]I) > 0,872 mg/mL (tanpa pengolahan awal).

Kata kunci: *Pengolahan Awal Biomassa, Bagas, Selulosa, Cairan Ionik, Fatty imidazolinium, Hidrolisis Enzimatik*

PRETREATMENT OF BAGASSE-BIOMASS USING FATTY IMIDAZOLINIUM SALTS TO ENHANCING ENZYMATIC HYDROLYSIS

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Abstract

Pretreatment of bagasse-biomass using fatty imidazolinium salts is found to be highly effective for enzymatic hydrolysis. The aim of this research is to know how is the performance of the ionic liquids based on fatty imidazolinium salt as ionic solvents for bagasse-biomass. Three ionic liquids have been synthesized and tested as solvents by a *microwave-heating* method. Three Ionic liquids are organic salts of cation cis-oleyl-imidazolinium ($[c\text{-}OIm]^+$) with three anions such as iodide ($[I]^-$), thiocyanate ($[SCN]^-$) and acetate ($[CH_3COO]^-$). The ionic liquids were synthesized according to literatures. The pretreatment (dissolution and precipitation of cellulose-solution by anti-solvent) increased the cellulose crystallinity (57.10% to 58.20%), changed the structure (cellulose I to cellulose II), reduced the particle size (from 136,3 nm to 68,9 nm), decreased the lignin content (compared to untreated one), and improved the glucose yield of enzymatic hydrolysis. The glucose yields for 48 hours enzymatic hydrolysis were 2,282 mg/mL (using [c-OIm] CH_3COO) > 1,779 mg/mL (using [c-OIm] SCN) > 1,272 mg/mL (using [c-OIm] I) > 0,872 mg/mL (without pretreatment). Pretreatment using ionic liquids fatty imidazolinium salts make bagasse more easily hydrolyzed by the cellulase enzyme and glucose yield is higher than without pretreatment.

Keywords: *Biomass Pretreatment, Bagasse, Cellulose, Ionic Liquids, Fatty Imidazolinium, Enzymatic Hydrolysis*