INTISARI

Jerami padi merupakan salah satu limbah yang paling banyak dihasilkan dari limbah agroindustri. Jerami padi memiliki kandungan selulosa yang cukup tinggi yakni 35-50%, 20-35% hemiselulosa, 10-25% lignin, dan zat lain penyusun jerami padi. Kandungan selulosa yang tinggi pada jerami padi tersebut berpotensi dalam produksi selulosa mikrokristal. Salah satu kegunaan selulosa mikrokristal di industri farmasi adalah sebagai eksipien. Proses pembuatan selulosa mikrokristal dilakukan dengan 3 tahapan yaitu proses delignifikasi, *bleaching*, dan hidrolisis. Pada penelitian ini seluruh proses dilakukan di dalam reaktor dengan pemanasan gelombang mikro. Proses delignifikasi dilakukan secara hidrotropik menggunakan urea dengan kondisi operasi: konsentrasi urea 30%, rasio padatan cairan 1:30, suhu 80^{o}C, dan waktu 60 menit. Setelah itu dilakukan *bleaching* menggunakan hidrogen peroksida 5%, NaOH 2%, rasio padatan cairan 1:10, suhu 70^{o}C, dan waktu 60 menit. Pulp yang dihasilkan kemudian dihidrolisis menggunakan masing-masing asam sulfat dan asam klorida dengan variasi konsentrasi asam 1, 2, 3 M, rasio padatan cairan 1:20, variasi suhu 80, 85, 90^{o}C, dan waktu reaksi 10, 20, 30, 40, 50 menit. Padatan hasil hidrolisis kemudian dianalisis menggunakan metode Chesson, FTIR, dan analisis derajat polimerisasi. Hasil analisis menggunakan FTIR menunjukkan fraksi kristalin selulosa tertinggi yaitu 64,81% yang yang diperoleh pada hidrolisis menggunakan asam sulfat 2 M, 85^{o}C selama 50 menit dengan *yield* sebesar 80,86%, kadar selulosa 47,93%, dan kadar lignin 9,77%. Sedangkan pada hidrolisis menggunakan asam klorida 2 M, 90 ^{o}C selama 20 menit dihasilkan fraksi kristalin selulosa sebesar 70,51% dengan *yield* sebesar 78,96%, kadar selulosa 65,36%, dan kadar lignin 10,88%.

Kata kunci: jerami padi; hidrolisis; gelombang mikro; selulosa mikrokristal; FTIR

ABSTRACT

Rice straw is one of the most abundant wastes generated from agro-industrial waste. Rice straw is mainly composed of three major polymers like cellulose, hemicellulose, and lignin with the compositions of 35-50%, 20-35%, and 10-25% respectively. The high cellulose content in rice straw shows the potential for the production of microcrystalline cellulose (MCC). One of the uses of MCC in the pharmaceutical industry is as an excipient. There are three important processes for MCC production, namely the delignification, bleaching, and hydrolysis. In this study, the whole processes were carried out in a reactor under microwave irradiation. The rice straw was successively pretreated with hydrotropic delignification and bleaching before being hidrolized. The hydrotropic delignification was performed at 80 ^{o}C for 60 minutes with urea solution 30% and liquid solid ratio of 1:30. After that, the bleaching was performed at 70 ^{o}C for 60 minutes with 5% hydrogen peroxide, 2% NaOH, and liquid solid ratio of 1:10. The resulting pulp is then being hydrolyzed using sulfuric acid and hydrochloric acid with various acid concentrations of 1, 2, 3 M, liquid solid ratio of 1:20, temperature variation of 80, 85, 90 ^{o}C and reaction times of 10, 20, 30, 40, 50 minutes. The solids from hydrolysis were then analyzed using the Chesson method, FTIR, and analysis of the degree of polymerization. The results of the analysis using FTIR showed that the highest crystalline cellulose fraction was 64,81% which was obtained during hydrolysis using 2 M sulfuric acid, 85 ^{o}C for 50 minutes resulting yield, cellulose content, and lignin content of 80,86%, 47,93%, 9,77% respectively. On the other hand, the hydrolysis using hydrochloric acid at 90 ^{o}C for 20 minutes resulting in a crystalline cellulose fraction of 70,51% with yield, cellulose content, and lignin content of 78,96%, 65,36%, 10,88% respectively.

Keywords*: rice straw; hydrolysis; microwave irradiation; microcrystal cellulose; FTIR*