

Sintesis kopolimer berbahan dasar selulosa jerami padi dan kinetika swelling = Synthesis of cellulose based copolymer from rice straw and swelling kinetics / Febbi Miyenti

Febbi Miyenti, author

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Abstrak

[ABSTRAK

Selulosa telah diisolasi dari jerami padi dengan tiga tahapan yaitu de-waxing, delignifikasi, dan penghilangan hemiselulosa. Rendemen selulosa yang didapatkan adalah 33,55%. Hidrogel superabsorben berbahan dasar selulosa jerami padi sebagai kerangka utama telah berhasil disintesis dengan komposisi monomer akrilamida 0,724 mol/L dan asam akrilat 1,429 mol/L, pengikat silang N,N'-metilena-bis-akrilamida 2,319 mmol/L, dan inisiator kalium persulfat 7,94 mmol/L. Kopolimerisasi dilakukan pada suhu 70°C dengan mengalirkan gas nitrogen. Kapasitas swelling dari superabsorbent yang dihasilkan pada swelling air sebesar 691,18 g/g dan swelling urea sebesar 765,58 g/g. Superabsorben memiliki kinetika swelling air dan urea mengikuti model kinetika pseudo-orde kedua dengan konstanta laju swelling air dan urea berturut-turut adalah 0,044 gram-1menit-1 dan 0,127 gram-1menit-1. Oleh karena itu persamaan laju swelling dapat dituliskan sebagai $v = k [\text{absorbat}]^2$. Karakterisasi selulosa dan superabsorben dilakukan dengan spektroskopi FTIR untuk analisis gugus fungsi, XRD untuk analisis pola difraksi, SEM untuk melihat morfologi permukaan hidrogel, dan DSC untuk analisis ketahanan termal.

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ABSTRACT

Cellulose had been isolated from rice straw with three steps, dewaxing, removal hemicellulose and delignification. Cellulose yield obtained was 33,55%. Cellulose-based superabsorbent was synthesized from rice straw with copolymerization of acrylamide and acrylic acid as monomer, N,N'-methylene-bis-acrylamide as cross-linker and potassium persulfate as initiator with composition 0,724 mol/L; 1,429 mol/L; 2,319 mmol/L; and 7,94 mmol/L, respectively. Copolymerization was conducted at temperature 70 °C in nitrogen atmosphere. Swelling capacity of superabsorbent in water is 691,18 g/g, and in urea solution is 765,58g/g. Swelling kinetic of superabsorbent follow pseudo-second order kinetics with rate constant in aqudest and urea was 0,044 gram-1minute-1 dan 0,127 gram-1minute-1. Thus, equation rate of swelling can be written as $v = k [\text{Absorbat}]^2$. Cellulose and superabsorbent was characterized with FTIR, XRD, SEM and DSC., Cellulose had been isolated from rice straw with three steps, dewaxing, removal hemicellulose and delignification. Cellulose yield obtained was 33,55%. Cellulose-based superabsorbent was synthesized from rice straw with copolymerization of acrylamide and acrylic acid as monomer, N,N'-methylene-bis-acrylamide as cross-linker and potassium persulfate as initiator with composition 0,724 mol/L; 1,429 mol/L; 2,319 mmol/L; and 7,94 mmol/L, respectively. Copolymerization was conducted at temperature 70 °C in nitrogen atmosphere. Swelling capacity of superabsorbent in water is 691,18 g/g, and in urea solution is 765,58g/g. Swelling kinetic of superabsorbent follow pseudo-second order kinetics with rate constant in aqudest and urea was 0,044 gram-1minute-1 dan 0,127 gram-1minute-1. Thus, equation rate of swelling can be written as $v = k [\text{Absorbat}]^2$. Cellulose and superabsorbent was characterized with FTIR, XRD, SEM and DSC.]