

SINTESIS FILM KOMPLEKS POLIELEKTROLIT KITOSAN/PEKTIN TERTAUT SILANG ASAM SULFAT DAN STUDI ADSORPSINYA TERHADAP SODIUM DODESIL SULFAT

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INTISARI

Telah dilakukan pembuatan film kompleks polielektrolit (KPE) kitosan/pektin tertaut silang asam sulfat sebagai adsorben sodium dodesil sulfat (SDS). Film KPE dibuat dalam berbagai variasi komposisi kitosan/pektin dengan cara melarutkan pektin dalam akuades kemudian ditambahkan kitosan dan asam asetat 0,4 M hingga homogen. Larutan yang homogen lalu dituangkan ke dalam cawan petri dan dioven pada suhu 70 °C selama 24 jam. Film KPE yang kering dilepaskan dari cawan petri dengan direndam dalam larutan NaOH 1 M selama 4 jam kemudian dicuci dengan akuades dan *phosphate-buffered saline* (PBS). Film KPE lalu ditaut silang dengan direndam dalam larutan H₂SO₄ 0,1 M selama 2 jam. Film KPE dikeringkan, dikarakterisasi, dan dilakukan studi adsorpsinya terhadap SDS. Karakterisasi film KPE dilakukan dengan menggunakan FTIR, SEM, uji *swelling* serta keasaman medium. Film KPE digunakan untuk adsorpsi SDS dengan parameter komposisi, waktu kontak, pH optimum, pengaruh konsentrasi awal SDS, dan kemampuan desorpsinya.

Spektra FTIR menunjukkan adanya puncak karakteristik untuk kitosan, pektin, dan interaksinya dengan asam sulfat. Permukaan film KPE mengalami perubahan menjadi lebih halus setelah digunakan untuk adsorpsi SDS melalui analisis menggunakan SEM. Film KPE komposisi 70:30 memperoleh persen *swelling* tertinggi dengan waktu optimum 60 menit. Film KPE cenderung stabil pada keseluruhan pH. Kondisi optimum adsorpsi SDS oleh film KPE kitosan/pektin tertaut silang asam sulfat terjadi pada waktu kontak 120 menit, pH 5, konsentrasi awal SDS 100 mg L⁻¹ dengan komposisi film 70:30. Adsorpsi mengikuti model kinetika orde kedua semu dan model isoterm Freundlich dengan K_F dan n berturut-turut sebesar 0,0297 dan 0,377. Desorpsi SDS tertinggi sebesar 97,6% tercapai dengan menggunakan larutan NaClO₄ 0,1 M.

Kata Kunci: adsorpsi, film kitosan/pektin, isoterm Freundlich, SDS, taut silang

SYNTHESIS OF SULFURIC ACID–CROSSLINKED CHITOSAN/PECTIN POLYELECTROLYTE COMPLEX FILM AND ITS ADSORPTION STUDY FOR SODIUM DODECYL SULFATE

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ABSTRACT

Synthesis of sulfuric acid-crosslinked chitosan/pectin polyelectrolyte complex (PEC) film as sodium dodecyl sulfate (SDS) adsorbent has been made. The PEC film was made by diluting pectin in distilled water then added with chitosan and 0,4 M acetic acid until homogenous in various chitosan/pectin mass ratio. The homogenous solution then placed into a petri dish and dried in 70 °C for 24 hours. The dried film was released from petri dish by soaking in 1 M NaOH solution for 4 hours then rinsed with distilled water and phosphate-buffered saline (PBS). PEC film then crosslinked by soaking in 0.1 M sulfuric acid for 2 hours. After that, the PEC film dried, characterized, and used as SDS adsorbent. PEC film characterized with FTIR, SEM, swelling, and its stability in the acid-base medium. The parameters used for SDS adsorption study were the optimum composition of PEC film, contact time, pH of the medium, the initial concentration of SDS, and its desorption ability.

The FTIR spectra showed the typical peak for chitosan, pectin, and sulfuric acid interaction. The surface of PEC film changed after used for SDS adsorption into smoother one that was analyzed with SEM. Swelling percentage of PEC film with 70:30 composition was the highest with 60 minutes optimum time. The PEC film was stable at any pH. The optimum condition for SDS adsorption with PEC film occurred at 120 minutes contact time, pH 5, and 100 mg L⁻¹ SDS initial concentration with 70:30 PEC film composition. The adsorption followed pseudo-second-order model and Freundlich isotherm, giving K_F of 0.0297 and n of 0.377. The highest SDS desorption 97.6% achieved by using 0.1 M NaClO₄.

Keywords: adsorption, chitosan/pectin film, Freundlich isotherm, SDS, crosslink