

INTISARI

SINTESIS MANIK KOMPLEKS POLIELEKTROLIT KITOSAN-KARBOKSIMETIL SELULOSA TERTAUT SILANG GLUTARALDEHIDA UNTUK ADSORPSI KRISTAL VIOLET

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Telah dilakukan sintesis manik kompleks polielektrolit (KPE) kitosan-karboksimetil selulosa (CMC) tertaut silang glutaraldehida untuk mengadsorpsi kristal violet. Tujuan dari penelitian ini yaitu mengetahui pengaruh penambahan agen taut silang glutaraldehida terhadap kestabilan manik KPE kitosan-CMC, mengetahui pengaruh variasi massa kitosan dan CMC terhadap kapasitas adsorpsi kristal violet, serta mengetahui pengaruh penambahan glutaraldehida terhadap kapasitas adsorpsi dan desorpsi kristal violet. Manik KPE kitosan-CMC dibuat dengan melarutkan CMC dalam asam asetat kemudian menambahkan kitosan. Campuran kitosan-CMC kemudian di teteskan dalam larutan NaOH dan ditambahkan agen taut silang glutaraldehida. Manik yang terbentuk dikarakterisasi menggunakan FTIR, SEM, uji penyerapan air, dan keasaman medium. Dipelajari juga pengaruh waktu, pH, konsentrasi awal kristal violet, kinetika adsorpsi-desorpsi, dan isoterm adsorpsi.

Hasil karakterisasi FTIR dan SEM menunjukkan bahwa manik KPE kitosan-CMC dan kitosan-CMC tertaut silang glutaraldehida berhasil disintesis dengan adanya perubahan pori setelah dan sebelum ditambah glutaraldehida. Manik KPE kitosan-CMC tertaut silang glutaraldehida stabil pada pH 1-12. Kondisi optimum adsorpsi diperoleh pada pH 8 dengan konsentrasi optimum 700 mg L⁻¹. Adsorpsi optimum manik kitosan-CMC pada rasio 15:5 (rasio massa kitosan:CMC) diperoleh sebesar 333,33 mg g⁻¹ di menit ke 600 dengan persentase desorpsi sebesar 35,20% dan pada manik kitosan-CMC tertaut silang glutaraldehida optimum pada penambahan glutaraldehida 1% dengan kapasitas adsorpsi sebesar 166,67 mg g⁻¹ di menit ke 540 dengan persentase desorpsi 4,42%. Kinetika adsorpsi kristal violet mengikuti orde kedua semu dan isoterm adsorpsi kristal violet mengikuti model Langmuir.

Kata kunci: sintesis manik KPE, kitosan, CMC, glutaraldehida, adsorpsi, kristal violet

ABSTRACT

SYNTHESIS OF GLUTARALDEHYDE–CROSSLINKED CHITOSAN– CARBOXYMETHYL CELLULOSE POLYELECTROLYTE COMPLEX BEADS TO ADSORPTION CRYSTAL VIOLET

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Polyelectrolyte complex (PEC) chitosan–carboxymethyl cellulose (CMC) beads cross–linked glutaraldehyde has been synthesized and used as crystal violet adsorption. The aims of the research is to determine the effect of cross–linked agent glutaraldehyde to the stability PEC chitosan–CMC beads, to know the effect of chitosan mass’s variation and CMC on the adsorption’s capacity of crystal violet, as well as to determine the effect of glutaraldehyde on PEC chitosan–CMC beads to the adsorption’s capacity of crystal violet. PEC chitosan–CMC beads are prepared by dissolving CMC in acetic acid and then adding the chitosan. The both solutions were mixtured and then sprayed into NaOH solution. Next, chitosan–CMC beads were cross–linked using glutaraldehyde agent. FTIR, SEM, water adsorption, and medium acidity were performed for beads characterization. This research also studies the effect of contact time, pH, initial concentration of crystal violet, the kinetics of the adsorption–desorption, and the adsorption isotherm.

The FTIR results showed that the beads have been successfully synthesized and the pore of beads were changed after glutaraldehyde addition as shown in SEM image. PEC chitosan–CMC beads cross–linked glutaraldehyde was stable at pH 1–12. The optimum condition of crystal violet adsorption occurs at pH 8 with a concentration of 700 mg L^{-1} . Optimum adsorption of beads 15:5 (ratio mass chitosan–CMC) was 333.33 mg g^{-1} at 600 minutes and the percentage of desorption was 35.20%. The optimum of chitosan–CMC cross-linked glutaraldehyde beads was on addition of 1% glutaraldehyde with adsorption capacity at 166.67 mg g^{-1} at 540 minutes and desorption percentage was 4.42%. Adsorption kinetics followed the pseudo second order with Langmuir isotherm.

Keywords: beads PEC, chitosan, CMC, glutaraldehyde, adsorption, crystal violet

