

ADSORPSI METILEN BIRU MENGGUNAKAN SELULOSA-ALGINAT TERTAUT SILANG EPIKLOROHIDRIN

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INTISARI

Adsorpsi metilen biru menggunakan selulosa-alginat tertaut silang epiklorohidrin telah dilakukan. Tujuan penelitian ini yaitu melakukan sintesis adsorben selulosa-alginat tertaut silang epiklorohidrin (Sel/Epi-Alg) serta menentukan pH, waktu kontak, dan konsentrasi awal metilen biru yang optimum pada adsorpsi metilen biru yang selanjutnya digunakan untuk mempelajari model kinetika dan isoterm adsorpsi metilen biru.

Adsorben Sel/Epi-Alg dapat disintesis menggunakan selulosa hasil isolasi dari eceng gondok dan natrium alginat dengan perbandingan 3:1. Selulosa, natrium alginat, dan epiklorohidrin sebagai agen penaut silang dilarutkan dalam larutan NaOH untuk menghasilkan adsorben Sel/Epi-Alg. Uji kestabilan adsorben Sel/Epi-Alg dilakukan pada larutan berair dengan berbagai rentang pH (2, 3, 4, 5, 6, 7, dan 8). Adsorben Sel/Epi-Alg digunakan untuk adsorpsi metilen biru (MB) yang kemudian dianalisis dengan spektrofotometer UV-Vis. Desorpsi MB dilakukan dengan akuades, larutan HCl pH 4, larutan NaCl 0,1 dan 1 M, serta etanol 40% dan 60%. Penelitian menghasilkan adsorben Sel/Epi-Alg yang stabil pada semua variasi pH. Kapasitas adsorpsi MB menggunakan adsorben Sel/Epi-Alg optimum pada pH 6, dengan waktu kontak 180 menit, dan konsentrasi awal MB 175 ppm. Adsorpsi MB menggunakan adsorben Sel/Epi-Alg menunjukkan model kinetika orde dua semu ($k_2 = 5,15 \times 10^{-4} \text{ g mg}^{-1} \text{ menit}^{-1}$) dan model isoterm Langmuir ($Q_{\max} = 175,44 \text{ mg g}^{-1}$). Hasil desorpsi menunjukkan bahwa MB terdesorpsi secara optimum (19,80 %berat) pada larutan NaCl 1 M.

Kata kunci: adsorpsi, alginat, metilen biru, selulosa, Sel/Epi-Alg.

ADSORPTION OF METHYLENE BLUE USING CELLULOSE- ALGINATE CROSSLINKED BY EPICHLOROHYDRIN

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ABSTRACT

Adsorption of methylene blue using cellulose-alginate crosslinked by epichlorohydrin was carried out. The aims of this analysis were to synthesize of cellulose-alginate crosslinked by epichlorohydrin (Sel/Epi-Alg) as an adsorbent and to determine the optimum pH, contact time, and methylene blue concentration. The study of kinetics and isotherm model for the adsorption of methylene blue was also studied.

The Sel/Epi-Alg adsorbent was synthesized using cellulose from water hyacinth isolation and sodium alginate (3:1). The cellulose, sodium alginate, and epichlorohydrin as crosslinker was dissolved in NaOH solution to produce an Sel/Epi-Alg adsorbent. The stability of Sel/Epi-Alg adsorbent was analyzed in various water pH (2, 3, 4, 5, 6, 7, and 8). Then, the Sel/Epi-Alg adsorbent was used for adsorption of methylene blue (MB), which was then analyzed by UV-Vis spectrophotometer. Desorption of MB was carried out by aquadest, HCl solution in pH 4, NaCl 0.1 and 1 M solution, as well as ethanol 40 and 60%. The results showed that the Sel/Epi-Alg adsorbent was stable in all pH variation. The adsorption capacity of the adsorbent towards the MB was optimum at pH 6, 180 min. of contact time, and 175 ppm of the MB concentration. The adsorption of MB using the Sel/Epi-Alg adsorbent showed the pseudo second order reaction ($k_2 = 5.15 \times 10^{-4} \text{ g mg}^{-1} \text{ menit}^{-1}$) and followed Langmuir isotherm ($Q_{\max} = 175.44 \text{ mg g}^{-1}$). The desorption of adsorbed MB was optimum (19.80 wt%) using NaCl 1 M solution.

Keywords: adsorption, alginate, cellulose, methylene blue, Sel/Epi-Alg.