



ADSORPSI METILEN BIRU MENGGUNAKAN SELULOSA-ASAM GLUTAMAT TERTAUT SILANG EPIKLOROHIDRIN

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INTISARI

Telah dipelajari adsorpsi metilen biru (MB) menggunakan selulosa-asam glutamat tertaut silang epiklorohidrin. Tujuan penelitian ini adalah melakukan sintesis adsorben selulosa-asam glutamat tertaut silang epiklorohidrin (Sel-Epi-Glu) serta penentuan pH optimum, isoterm, dan kinetika adsorpsi terhadap MB. Isolasi selulosa yang berasal dari mahkota nanas dilakukan menggunakan NaOH dan NaClO dilanjutkan sintesis adsorben dengan mencampurkan selulosa, asam glutamat dan agen penaut silang epiklorohidrin dalam kondisi basa (Sel-Epi-Glu). Adsorben diuji kestabilan pada berbagai pH (2-8) dan dikarakterisasi dengan FTIR dan SEM-EDX. Kajian adsorben Sel-Epi-Glu dipelajari pada adsorpsi MB meliputi penentuan pH optimum, isoterm adsorpsi, dan kinetika adsorpsi. Metilen biru yang terserap dianalisis dengan spektrofotometer UV-Vis. Studi desorpsi MB dilakukan dalam pelarut akuades, HCl pH 4, etanol 40% dan 60%, serta NaCl 0,1 dan 1 M.

Hasil penelitian menunjukkan bahwa adsorben Sel-Epi-Glu stabil pada pH 2-8. Kapasitas adsorpsi MB optimum oleh adsorben Sel-Epi-Glu sebesar 112,465 mg g⁻¹ diperoleh pada pH 5, konsentrasi MB 150 mg L⁻¹ dan waktu kontak 180 menit⁻¹. Adsorpsi MB oleh adsorben Sel-Epi-Glu mengikuti model isoterm Langmuir dan mengikuti kinetika orde dua semu Ho dan Mc Kay dengan konstanta adsorpsi sebesar 3,06 x 10⁻⁴ g mg⁻¹ menit⁻¹. Pada kajian desorpsi didapatkan hasil MB terdesorpsi optimum (25,13%) pada NaCl 1 M.

Kata kunci: adsorben Sel-Epi-Glu, isoterm, kinetika, metilen biru, pH



ADSORPTION OF METHYLENE BLUE USING CELLULOSE- GLUTAMIC ACID CROSS-LINKED BY EPICLOROHYDRINE

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ABSTRACT

The adsorption of methylene blue (MB) has been studied using epichlorohydrin crosslinked cellulose-glutamic acid. The aim of this study is to synthesize epichlorohydrin (Sel-Epi-Glu) crosslinked cellulose-glutamic acid adsorbent and to determine the optimum pH, isotherm, and adsorption kinetics of MB. Isolation of cellulose from pineapple crown was carried out using NaOH and NaClO followed by synthesis of adsorbent by mixing cellulose, glutamic acid and epichlorohydrin crosslinking agent under alkaline conditions (Sel-Epi-Glu). The adsorbent was tested for stability at various pH (2-8) and characterized by FTIR and SEM-EDX. Study of the Sel-Epi-Glu adsorbent studied on MB adsorption including determining the optimum pH, adsorption isotherm, and adsorption kinetics. The adsorbed methylene blue was analyzed by UV-Vis spectrophotometer. MB desorption studies were carried out in distilled water, HCl pH 4, ethanol 40% and 60%, and NaCl 0.1 and 1 M.

The results showed that the Sel-Epi-Glu adsorbent was stable at pH 2-8. The optimum MB adsorption capacity by Sel-Epi-Glu adsorbent of $112.465 \text{ mg g}^{-1}$ was obtained at pH 5, MB concentration 150 mg L^{-1} and contact time 180 min^{-1} . MB adsorption by Cell-Epi-Glu adsorbent followed the Langmuir isotherm model and followed the pseudo-second-order kinetics of Ho and Mc Kay with adsorption constants of $3.06 \times 10^{-4} \text{ g mg}^{-1} \text{ min}^{-1}$. In the desorption study, it was found that the optimum desorbed MB (25.13%) was found in 1 M NaCl.

Keywords: isotherm, kinetics, methylene blue, pH, Sel-Epi-Glu adsorbent