



ADSORPSI ION Cd(II) MENGGUNAKAN SELULOSA-ALGINAT TERTAUT SILANG EPIKLOROHIDRIN

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INTISARI

Adsorpsi ion Cd(II) menggunakan adsorben selulosa-alginat tertaut silang epiklorohidrin telah dilakukan. Penelitian ini bertujuan untuk melakukan sintesis adsorben selulosa-alginat tertaut silang epiklorohidrin (SEL-ALG), menentukan pH optimum, kinetika adsorpsi dan isoterm adsorpsi ion Cd(II) pada adsorben SEL-ALG.

Pembuatan adsorben diawali dengan isolasi selulosa yang berasal dari batang eceng gondok (*Eichhornia crassipes*) yang telah dihaluskan. Selulosa ditaut silangkan dengan natrium alginat menggunakan agen penaut silang epiklorohidrin dipanaskan pada suhu 60 °C selama 2 jam. Adsorben hasil sintesis di karakterisasi menggunakan spektroskopi FTIR, AAS, XRD, SEM-EDX dan uji stabilitas pada pH larutan 2-8. Studi desorpsi ion Cd(II) dilakukan pada larutan akuades, Na₂EDTA 0,1 M, NH₄Cl 0,1 M, dan HCl 0,1 M.

Penelitian menghasilkan adsorben SEL-ALG yang stabil pada semua variasi pH. Kapasitas adsorpsi ion Cd(II) menggunakan adsorben SEL-ALG optimum pada pH 4, dengan waktu kontak 120 menit, dan konsentrasi awal ion Cd(II) 200 ppm. Adsorpsi ion Cd(II) oleh adsorben SEL-ALG mengikuti model kinetika orde dua semu dengan konstanta laju reaksi sebesar $6,46 \times 10^{-3} \text{ g mg}^{-1} \text{ menit}^{-1}$ dan model isoterm yang sesuai yaitu model Freundlich. Hasil desorpsi menunjukkan bahwa larutan Na₂EDTA 0,1 M merupakan larutan yang paling efektif untuk mendesorpsi ion Cd(II).

Kata kunci: adsorben SEL-ALG, alginat, Cd(II), epiklorohidrin, selulosa



ADSORPTION OF Cd(II) ION USING CELLULOSE-ALGINATE CROSSLINKED WITH EPICHLOROHYDRIN

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ABSTRACT

The adsorption of the Cd(II) ion using cellulose-alginate crosslinked by epichlorohydrin has been carried out. The purposes of this research are to synthesize epichlorohydrin crosslinked cellulose-alginate (SEL-ALG), determine the optimum pH of Cd(II) adsorption, determine Cd(II) ion adsorption kinetics, and determine Cd(II) ion adsorption isotherms using SEL-ALG adsorbent.

The adsorbent was prepared from cellulose derived from common water hyacinth (*Eichhornia crassipes*) stems. Cellulose was crosslinked with alginate with the addition of epichlorohydrin as a crosslinking agent by heating at 60 °C for 2 hours. The adsorbent was interacted with Cd(II) ions at various pH, contact times, and concentrations. The isotherm and the kinetics of adsorption were defined from the various concentrations and contact time. The adsorbent of SEL-ALG was characterized using FTIR, XRD, SEM-EDX spectroscopies, and stabilization test in a solution of pH 2-8. The desorption study of Cd(II) ion was carried out in distilled water, Na₂EDTA 0.1 M, NH₄Cl 0.1 M, and HCl 0.1 M solutions.

The results showed that the SEL-ALG adsorbent was stable in all pH variations. The adsorption capacity of the adsorbent towards the Cd(II) ions was optimum at pH 4, 120 min of contact time, and 200 ppm of the Cd(II) ions concentration. The adsorption of Cd(II) ion by SEL-ALG adsorbent followed pseudo-second-order kinetic models with a reaction rate constant of $6.46 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$ and isotherm adsorption followed the Freundlich adsorption isotherm model. Desorption studies showed that Na₂EDTA 0.1 M were the most effective solutions for desorbing Cd(II) ions.

Keywords: SEL-ALG adsorbent, alginate, Cd(II), epichlorohydrin, cellulose