SINTESIS MANIK ALGINAT-KITOSAN-ASAM HUMAT SEBAGAI ADSORBEN LOGAM Cd(II)

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INTISARI

Sintesis manik alginat-kitosan-asam humat (AG-K-AH) sebagai adsorben logam Cd(II) telah dilakukan. Penelitian ini bertujuan untuk mengetahui kemampuan adsorpsi manik terhadap logam Cd(II), mempelajari kinetika dan model isoterm adsorpsi serta mengetahui kemampuan desorpsi manik terhadap logam Cd(II). Sintesis manik AG-K-AH dilakukan dengan perbandingan komposisi 1:1:1, 2:1:1, 4:1:1 dan 8:1:1. Manik dikarakterisasi menggunakan FTIR dan SEM-EDX. Studi adsorpsi dilakukan dengan menentukan komposisi optimum manik, pH optimum larutan, waktu kontak optimum serta konsentrasi awal larutan. Hasil penentuan waktu kontak dan konsentrasi awal larutan digunakan untuk mempelajari kinetika dan model isoterm adsorpsi. Studi desorpsi dilakukan dengan mempelajari pengaruh variasi larutan pendesorp serta pengaruh variasi waktu desorpsi.

Karakterisasi dengan FTIR menunjukkan adanya gugus fungsi –COOH, –OH, dan $–NH_2$ dari komponen penyusun manik yang saling berinteraksi. Citra SEM menunjukkan morfologi, tekstur dan komposisi permukaan manik. Kapasitas maksimum adsorpsi logam Cd(II) sebesar 49,75 mg g^{-1} diperoleh pada kondisi perbandingan komposisi optimum AG-K-AH 8:1:1 dalam larutan Cd(II) pH 5 dengan waktu kontak 210 menit dan konsentrasi awal adsorbat sebesar 200 mg L^{-1}. Adsorpsi logam Cd(II) menggunakan manik AG-K-AH mengikuti model kinetika orde dua semu dan model isoterm Langmuir. Desorpsi logam Cd(II) menunjukkan persen desorpsi tertinggi menggunakan larutan HNO_3 0,1 M sebesar 92,68%.

Kata kunci: adsorpsi, alginat, asam humat, kitosan, logam Cd(II)

SYNTHESIS OF ALGINATE-CHITOSAN-HUMIC ACID BEADS AS METAL ADSORBENT OF Cd(II)

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ABSTRACT

Synthesis of alginate-chitosan-humic acid (AG-C-HA) beads as metal adsorbent of Cd(II) has been carried out. This study aims to determine the adsorption ability of the beads, study the kinetics and adsorption isotherm model, also determine the ability of beads desorption. Synthesis of AG-C-HA beads was carried out with a composition ratio 1:1:1, 2:1:1, 4:1:1 and 8:1:1. The beads were characterized using FTIR and SEM-EDX. The adsorption study was carried out by determining the optimum beads composition, optimum pH of the solution, optimum contact time and the initial concentration of the solution. The results of determining the contact time and initial concentration were used to study the kinetics and adsorption isotherm models. Desorption studied were carried out by studying the effect of variations in the desorption solution and affect of variations in desorption time.

The FTIR spectra represented that beads have –OH, –COOH, and $–NH_2$ functional groups form interacting components of beads. The SEM image shows morphology, texture and surface composition of beads. The maximum adsorption capacity of 49.75 mg g^{-1} was achieved with AG:C:HA ratio of 8:1:1 at pH 5, with a contact time of 210 min in 200 mg L^{-1} of initial adsorbate concentration. Adsorption of Cd(II) metal using AG-C-HA beads followed well pseudo-second order kinetic model and adsorption experimental data were better fitted with the Langmuir isotherm model. The desorption of Cd(II) showed the highest desorption percent of 92,68% by using HNO_3 0.1 M solution.

Keywords: adsorption, alginate, Cd(II) metal, chitosan, humic acid