

SYNTHESIS OF ALGINATE-HUMIC ACID-ACTIVATED CARBON COMPOSITE BEADS AS AN ADSORBENT FOR Zn(II)

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ABSTRACT

Research on the synthesis of alginate-humic acid-activated carbon beads has been done and used for the adsorption of Zn(II) ion. This research began with synthesized of modified beads and followed by characterization of beads that have been formed using FTIR, SEM, SAA, and pH stability testing. Furthermore, the ability of beads adsorption tested to adsorb Zn(II) ion was analyzed in a variety of compositional beads, contact time, pH, and initial concentration of Zn(II) ions. Afterwards, the adsorption isotherm, adsorption kinetics, and desorption test were studied.

The results of the characterization with FTIR indicated that beads had hydroxyl and carbonyl active groups, while the characterization with SEM denoted the presence of mesoporous structures, and the stability of beads at pH 2-6. In the adsorption process, beads with 1:1:1 ratio of alginate:humic acid:activated carbon composition represents the highest adsorption value. The optimum conditions of adsorption were obtained at pH 5 after 180 minutes. Adsorption kinetics followed pseudo-second order model and Freundlich isotherm as isotherm model. Desorption studied was represented by Na₂EDTA with the highest percentage value.

Keywords: beads, Alginate, Humic Acid, Activated Carbon, Zn(II) ion

SINTESIS BEADS ALGINAT-ASAM HUMAT-ACRBBON AKTIF SEBAGAI ADSORBEN Zn(II)

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INTISARI

Telah dilakukan penelitian mengenai sintesis beads alginat-asam humat-karbon aktif dan digunakan untuk adsorpsi-desorpsi ion Zn(II). Penelitian ini diawali dengan karakterisasi beads yang sudah terbentuk menggunakan FTIR, SEM, SAA, serta uji kestabilan pH. Selanjutnya uji kemampuan adsorpsi beads terhadap ion Zn(II) dilakukan dalam berbagai variasi perbandingan komposisi penyusun beads, waktu kontak, pH, dan konsentrasi awal logam Zn(II). Setelah itu dilakukan studi isotherm adsorpsi, kinetika adsorpsi, dan uji desorpsi.

Hasil karakterisasi dengan FTIR menunjukkan beads memiliki gugus aktif hidroksil dan karbonil, karakterisasi dengan SEM menunjukkan adanya struktur mesopori, dan kestabilan beads pada pH 2-6. Pada proses adsorpsi, beads dengan komposisi alginat:asam humat:karbon aktif 1:1:1 menunjukkan komposisi dengan nilai adsorpsi tertinggi. Kondisi optimum adsorpsi diperoleh pada pH 5 di menit ke 180. Kinetika adsorpsi ion mengikuti orde dua semu dan mengikuti model isotherm Freundlich. Kajian desorpsi menunjukkan Na₂EDTA menjadi pendesorp dengan nilai presentase tertinggi.

Kata kunci : *beads*, alginat, asam humat, karbon aktif, ion Zn(II)