IMMOBILISASI DITIZON PADA BENTONIT ALAM DAN TEKNIS SEBAGAI ADSORBEN ION Cd (II)

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INTISARI

Penelitian tentang immobilisasi ditizon pada bentonit alam dan teknis sebagai adsorben ion Cd(II) telah dilakukan. Tujuan dari penelitian ini yaitu mensintesis bentonit alam dan teknis terimobilisasi ditizon, mengkaji faktor-faktor yang mempengaruhi adsorpsi, dan menentukan interaksi antara ion Cd(II) dengan adsorben.

Sintesis bentonit terimobilisasi ditizon dilakukan dengan aktivasi bentonit menggunakan HCl 4M. Ditizon diimmobilisasikan pada bentonit dengan perbandingan bentonit dan ditizon yaitu 4:1. Bentonit alam dan teknis terimmobilisasi ditizon dikarakterisasi menggunakan XRD dan FTIR. Adsorben diaplikasikan untuk mengadsorpsi ion Cd(II) berdasarkan variasi pH, massa adsorben, waktu kontak, dan konsentrasi awal larutan.

Berdasarkan karakterisasi XRD dan FTIR menunjukan bahwa ditizon telah berhasil diimmobilisasikan pada bentonit alam dan teknis. Hasil adsorpsi menunjukkan bahwa kondisi optimum adsorpsi diperoleh pada pH 5, massa adsorben 100 mg, waktu kontak 60 menit dan konsentrasi optimum 50 ppm. Adsorpsi pada bentonit alam teraktivasi (BA-A), bentonit teknis teraktivasi (BT-A), bentonit alam terimmobilisasi ditizon (BA-D) dan bentonit teknis terimmobilisasi ditizon (BT-D) mengikuti kinetika pseudo orde 2. Isoterm adsorpsi dari BA-A, BA-D, BT-A, dan BT-D mengikuti isotherm adsorpsi Langmuir. Immobilisasi ditizon pada bentonit meningkatkan kemampuan adsorpsi pada bentonit alam yaitu $1{,}70x10^{-5}$ dan $2{,}77x10^{-5}$ mol/g (meningkat 46%) sedangkan bentonit teknis yaitu $1{,}96x10^{-5}$ dan $2{,}77x10^{-5}$ mol/g (meningkat 41%). Hasil eksperimen desorpsi menunjukkan bahwa interaksi yang terjadi antara adsorben dan ion Cd(II) melalui interaksi elektrostatik, interaksi atom yang memiliki perbedaan densitas elektron, dan pemakaian pasangan elektron bersama.

Kata kunci: adsorpsi, bentonit, immobilisasi, Cd(II)

IMMOBILIZATION OF DITHIZONE ON NATURAL AND TECHNICAL BENTONITES AS ADSORBENT OF Cd(II) ION

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ABSTRACT

Study on immobilization of dithizone on natural and technical bentonite as adsorbent of Cd(II) ions has been carried out. The aims of this research are to synthesis dithizone-immobilized natural and technical bentonites, examination of influencing factors of adsorption, and examination of the interaction between Cd(II) ion and adsorbent.

Synthesis of dithizone-immobilized bentonites was done by activating natural and technical bentonites using HCl 4M. Dithizone was immobilized on bentonite with the ratio 1:4. Dithizone-immobilized natural and technical bentonites were characterized by XRD and FTIR. Adsorbents were applied to adsorb Cd(II) ions based on pH effect, adsorbent mass, contact time, and initial concentration of the solution.

Based on characterization of FTIR and XRD, immobilization dithizone on natural and technical bentonites has been successfully synthesized. The result of adsorption showed that optimum conditions of adsorption were obtained at pH 5, the mass of 100 mg, contact time 60 minutes and initial concentration of 50 ppm. Adsorption of activated natural bentonite (BA-A), activated technical bentonite (BT-A), dithizone-immobilized natural bentonite (BA-D) and dithizone-immobilized technical bentonite (BT-D) determined using adsorption kinetics of pseudo second order. Adsorption of isotherm of BA-A, BA-D, BT-A, and BT-D followed Langmuir isotherm model that adsorption capacities were $1.70x10^{-5}$, $2.48x10^{-5}$, $1.96x10^{-5}$, and $2.77x10^{-5}$ mol/g. According to desorption experiment, interactions of bentonites and Cd(II) ions occur through electrostatic, the difference in electron density, and lone pair electron interaction.

Keywords: adsorption, bentonite, immobilization, Cd(II)