SINTESIS KOMPOSIT MAGNETIT/KITOSAN/KARBON AKTIF DAN APLIKASINYA SEBAGAI ADSORBEN Pb(II)

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INTISARI

Telah dilakukan sintesis komposit magnetit/kitosan/karbon aktif sebagai adsorben Pb(II). Karbon aktif disintesis dari ampas tebu menggunakan metode karbonisasi dan aktivator H_3PO_4. Sintesis adsorben komposit magnetit/kitosan/ karbon aktif dilakukan dengan metode kopresipitasi dan memanfaatkan NH_4OH sebagai agen pengendap hingga pH mencapai 11. Material dikarakterisasi dengan *Fourier Transform Infra-Red Spectroscopy* (FTIR), *X-Ray Diffraction* (XRD), *Scanning Electron Microscope Energy Dispersive X-Ray Spectrometer* (SEM-EDX), dan *Vibrating Sample Magnetometer* (VSM). Kajian adsorpsi Pb(II) yang dilakukan meliputi variasi pH, kinetika adsorpsi, isoterm adsorpsi, dan energi adsorpsi. Konsentrasi Pb(II) dianalisis menggunakan *Atomic Absorption Spectrophotometer* (AAS).

Hasil karakterisasi menunjukkan bahwa komposit magnetit/kitosan/karbon aktif telah berhasil disintesis. Adsorpsi Pb(II) menggunakan komposit terjadi secara optimum pada pH 6 dan mengikuti kinetika orde kedua-semu model Ho-McKay dengan konstanta laju adsorpsi sebesar 0,0958 g mg^{-1} $menit^{-1}$. Isoterm adsorpsi Pb(II) mengikuti model Freundlich dan didapatkan nilai K_F sebesar 6,724 L mg^{-1}. Parameter termodinamika menunjukkan bahwa adsorpsi Pb(II) oleh komposit magnetit/kitosan/karbon aktif terjadi secara spontan dan bersifat endotermis.

Kata kunci: adsorpsi, komposit magnetit/kitosan/karbon aktif, Pb(II)

SYNTHESIS MAGNETITE/CHITOSAN/ACTIVATED CARBON COMPOSITES AND ITS APPLICATION AS Pb(II) ADSORBENTS

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ABSTRACT

Synthesis of magnetite/chitosan/activated carbon composite as Pb(II) metal adsorbent has been done. Activated carbon was synthesized with sugarcane bagasse using the carbonization method and H_3PO_4 activator. Synthesis of magnetite/ chitosan/activated carbon composite adsorbent was carried out by coprecipitation method and utilized NH_4OH as a precipitating agent until the pH reached 11. The material was characterized by Fourier Transform Infra-Red Spectroscopy (FTIR), X-Ray Diffraction (XRD), Scanning Electron Microscope Energy Dispersive X-Ray Spectrometer (SEM-EDX), and Vibrating Sample Magnetometer (VSM). Adsorption of Pb(II) were carried out covering variations in pH, adsorption kinetics, adsorption isoterms, and adsorption energy. Concentration of Pb(II) was analyzed using Atomic Absorption Spectrophotometer (AAS).

The characterization results show that the magnetite/chitosan/activated carbon composite has been successfully synthesized. The study of Pb(II) adsorption using composites occurred optimally at pH 6 and followed the pseudo-second-order kinetics of the Ho-McKay model with an adsorption rate constant of 0.0958 g mg^{-1} $minutes^{-1}$. The Pb(II) adsorption isoterm followed the Freundlich model and obtained a K_f value of 6.724 L mg^{-1}. Thermodynamic parameters showed that the adsorption of Pb(II) by magnetite/chitosan/activated carbon composite occurred spontaneously and was endothermic.

Keyword: adsorption, magnetite/chitosan/activated carbon composites, Pb(II)