

SINTESIS KOMPOSIT MAGNETIT/OLEAT/KITOSAN/GLUTARALDEHIDA DAN APLIKASINYA SEBAGAI ADSORBEN Pb(II)

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INTISARI

Telah dilakukan sintesis komposit magnetit/oleat/kitosan/glutaraldehida (MOKG) dan aplikasinya sebagai adsorben Pb(II). Komposit disintesis dengan mencampur kitosan yang telah ditaut silang oleh glutaraldehida dan magnetit-oleat. Sintesis komposit MOKG dilakukan dengan menggunakan metode kopresipitasi yang memanfaatkan NH_4OH sebagai agen pengendap. Komposit kemudian dikarakterisasi menggunakan *Fourier Transform Infra-Red Spectroscopy* (FTIR), *X-Ray Diffraction* (XRD), *Vibrating Sample Magnetometer* (VSM), dan *Transmission Electron Microscopy* (TEM). Penelitian ini dilakukan untuk mengkaji kemampuan komposit untuk mengurangi konsentrasi Pb(II) dalam limbah cair dengan menentukan pH optimum adsorpsi, mengkaji kinetika, isoterm dan termodinamika adsorpsi logam Pb(II). Konsentrasi Pb(II) dianalisis menggunakan *Atomic Absorption Spectrophotometer* (AAS).

Hasil dari penelitian ini menunjukkan bahwa komposit MOKG telah berhasil disintesis dan dibuktikan dengan analisis FTIR, XRD, VSM, dan TEM. Adsorpsi Pb(II) menggunakan komposit terjadi secara optimum pada pH 6 dan mengikuti kinetika orde dua semu Ho-Mckay dengan konstanta laju reaksi $0,0089 \text{ g mg}^{-1} \text{ menit}^{-1}$. Isoterm adsorpsi Pb(II) mengikuti model Langmuir dan didapatkan kapasitas adsorpsi maksimum sebesar $75,188 \text{ mg g}^{-1}$ serta K_L sebesar $2,015 \text{ L mg}^{-1}$. Parameter termodinamika menunjukkan bahwa adsorpsi Pb(II) oleh komposit magnetit/oleat/kitosan/glutaraldehida terjadi secara spontan dan bersifat eksotermis.

Kata kunci: adsorpsi, komposit, Pb(II)

SYNTHESIS OF MAGNETITE/OLEIC/CHITOSAN/GLUTARALDEHYDE COMPOSITES AS THE ADSORBENT OF Pb(II)

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ABSTRACT

Synthesis of magnetite/oleic/chitosan/glutaraldehyde (MOKG) composites as the adsorbent of Pb(II) has been carried out. The composites was synthesized by mixing chitosan which had been cross-linked by glutaraldehyde and magnetite-oleic. The synthesis of MOKG composites was carried out using the coprecipitation method which utilizes NH_4OH as a precipitating agent. The composites were characterized using Fourier Transform Infra-Red Spectroscopy (FTIR), X-Ray Diffraction (XRD), Vibrating Sample Magnetometer (VSM), and Transmission Electron Microscopy (TEM). This research was conducted to assess the ability of composites to reduce Pb(II) concentrations in wastewater by determining the optimum adsorption pH, studying the kinetics, isotherm, and thermodynamic adsorption of Pb(II). Concentration of Pb(II) was analyzed using Atomic Absorption Spectrophotometer (AAS).

The results of this study indicate that the composites has been successfully synthesized and proven by FTIR, XRD, VSM, and TEM analysis. The optimum adsorption of Pb(II) using the composite occurred at pH 6 and followed the Ho-Mckay pseudo-second-order kinetics with a reaction rate constant of $0.0089 \text{ g mg}^{-1} \text{ min}^{-1}$. The Pb(II) adsorption isotherm followed the Langmuir model and obtained a maximum adsorption capacity of 75.188 mg g^{-1} and a K_L value of $2,015 \text{ L mg}^{-1}$. The thermodynamic parameters showed that the adsorption of Pb(II) by the magnetite/oleic/chitosan/glutaraldehyde composite occurred spontaneously and was exothermic.

Keyword: adsorption, composites, Pb(II)