

SINTESIS KOMPOSIT KITOSAN/MAGNETIT/ASAM OLEAT DAN APLIKASINYA SEBAGAI ADSORBEN Cd(II)

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INTISARI

Telah disintesis komposit kitosan/magnetit/asam oleat untuk adsorpsi logam Cd(II) di dalam larutan. Tujuan penelitian untuk mengetahui pH optimum yang digunakan untuk adsorpsi dan menentukan kinetika dan isoterm adsorpsi dari komposit yang disintesis.

Penelitian ini diawali dengan isolasi kitosan dari limbah cangkang udang. Selanjutnya magnetit dibuat melalui metode kopresipitasi dan dimodifikasi dengan penambahan asam oleat. Kitosan kemudian ditambahkan ke dalam magnetit/asam oleat dengan glutaraldehida sebagai agen penaut silang. Komposit dikarakterisasi dengan FTIR, XRD, TEM dan VSM. Komposit yang dihasilkan diaplikasikan sebagai adsorben Cd(II) dalam medium cair. Kinetika adsorpsi komposit kitosan/magnetit/asam oleat dikaji dalam 4 model kinetika yaitu orde satu, orde dua, orde kesatu semu, dan orde kedua semu. Kapasitas adsorpsi komposit kitosan/magnetit/asam oleat dikaji menggunakan persamaan isoterm Langmuir dan Freundlich.

Hasil penelitian menunjukkan bahwa komposit kitosan/magnetit/asam oleat yang dihasilkan berupa serbuk berwarna hitam, dapat ditarik menggunakan medan magnet eksternal dan memiliki ukuran partikel antara 19-43 nm. Adsorpsi Cd(II) oleh komposit kitosan/magnetit/asam oleat secara optimal terjadi pada pH 7 dan mengikuti model kinetika adsorpsi orde keduasemu dengan nilai konstanta laju reaksi (k) sebesar $11,773 \times 10^{-3} \text{ g mg}^{-1} \text{ menit}^{-1}$ dan mengikuti isoterm adsorpsi Langmuir dengan nilai kapasitas adsorpsi (K_L) sebesar $6,134 \text{ L mmol}^{-1}$ atau $0,055 \text{ L mg}^{-1}$.

Kata kunci: kitosan, magnetit, asam oleat, adsorpsi.

SYNTHESIS OF CHITOSAN/MAGNETITE/OLEIC ACID COMPOSITE AND THE APPLICATION AS Cd(II) ADSORBENT

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ABSTRACT

Composite of chitosan/magnetite/oleic acid has been synthesized to adsorb Cd (II) in a solution. The aims of this researches are to know the optimum pH used for adsorption and to determine kinetics and adsorption isotherm of the synthesized composite.

This experiment was firstly conducted by isolation of chitosan from shrimp shell waste. The magnetite was made by coprecipitation method and was modified with oleic acid. Chitosan was added to the magnetite/oleic acid with glutaraldehyde as a crosslinking agent. The composite was characterized by FTIR, XRD, TEM and VSM. The product of composite was applied as Cd (II) adsorbent in aqueous medium. Kinetics adsorption of chitosan/magnetite/oleic acid composite was examined with 4 kinetics models such as the first order, second order, pseudo first order, and pseudo second order. The adsorption capacity of chitosan/magnetite/oleic acid composite was studied by using the Langmuir and Freundlich isotherm equations.

The result showed that chitosan/magnetite/oleic acid composite which had black powder, could be drawn using an external magnetic field, and had a particle size 19-43 nm. Adsorption of Cd (II) by chitosan/magnetite/oleic acid composite optimum occurred at pH 7 and fit to the adsorption kinetic model of pseudo second order with the rate constant (k) of $11.773 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$ and fit to the adsorption isotherm of Langmuir with the adsorption capacity (K_L) of $6.134 \text{ L mmol}^{-1}$ or 0.055 L mg^{-1} .

Keywords: chitosan, magnetite, oleic acid, adsorption.