



SINTESIS KOMPOSIT KITOSAN/ZEOLIT/MAGNETIT DAN APLIKASINYA SEBAGAI ADSORBEN NIKEL(II)

ALDILLAH RIZKITA
13/347244/PA/15180

INTISARI

Telah dilakukan sintesis komposit kitosan/zeolit/magnetit untuk mengadsorpsi logam Ni(II) di dalam larutan. Sintesis komposit diawali dengan modifikasi zeolit alam teraktivasi dengan magnetit kemudian dimodifikasi dengan kitosan dan ditaut silang dengan glutaraldehid. Komposit kitosan/zeolit/magnetit yang terbentuk dikarakterisasi dengan FTIR, XRD, TEM, dan VSM. Komposit yang dihasilkan diaplikasikan sebagai adsorben Ni(II) dalam medium cair. Kinetika adsorpsi komposit kitosan/zeolit/magnetit dikaji dalam 4 model kinetika yaitu orde kesatu Santosa dan Muzakky, orde kesatu semu Lagergren, orde kedua Langmuir dan Heinshelwood, dan orde kedua semu Ho dan McKay. Kapasitas adsorpsi komposit kitosan/zeolit/magnetit dikaji menggunakan persamaan isoterm Langmuir dan Freundlich.

Hasil penelitian menunjukkan bahwa komposit kitosan/zeolit/magnetit yang dihasilkan berupa serbuk berwarna hitam, dapat ditarik menggunakan medan magnet eksternal, dan memiliki ukuran partikel yang berkisar antara 9,0-14,7 nm. Adsorpsi Ni(II) oleh kitosan/zeolit/magnetit secara optimal terjadi pada pH 5 dan mengikuti model kinetika adsorpsi pseudo orde kedua semu Ho dan McKay dengan nilai konstanta laju reaksi (k) sebesar $3,9514 \times 10^{-2}$ g/mg.menit dan mengikuti isoterm adsorpsi Langmuir dengan nilai kapasitas adsorpsi (Q_0) sebesar 14,4093 mg/g atau $2,4544 \times 10^{-4}$ mol/g. Uji *recovery* adsorben menunjukkan bahwa komposit kitosan/zeolit/magnetit dapat dipisahkan dari larutan lebih mudah dan cepat menggunakan medan magnet eksternal dibandingkan dengan pemisahan kitosan atau zeolit.

Kata kunci: kitosan, zeolit, magnetit, komposit, adsorpsi Ni(II).



SYNTHESIS OF CHITOSAN/ZEOLITE/MAGNETITE COMPOSITE AND THE APPLICATION AS ADSORBENT OF NICKEL(II)

ALDILLAH RIZKITA
13/347244/PA/15180

ABSTRACT

Chitosan/zeolite/magnetite composite has been synthesized as adsorbent of Ni(II) and the application has been conducted. Synthesis of composite was started by modification of activated natural zeolite with magnetite using coprecipitation method, then modified with chitosan cross-linked by glutaraldehyde. The chitosan/zeolite/ magnetite composite formed was characterized using FTIR, XRD, TEM, and VSM. The results of composite was applied as an adsorbent of Ni(II) in the liquid solution. The kinetics data of adsorption process were analyzed by four models, which are first order adsorption Santosa and Muzakky, Lagergren pseudo first order adsorption, Langmuir and Hinshelwood adsorption and pseudo second order adsorption Ho and McKay. The capacity adsorption of chitosan/zeolite/magnetite/ composite was studied using Langmuir and Freundlich equations.

The results showed that the composite of chitosan/zeolite/magnetite produced in the form of black powder, can be separate well from solution using an external magnetic field, and has a particle size ranging from 9.0-14.7 nm. The optimum pH of Ni(II) adsorption by chitosan/zeolite/magnetite was 5. Kinetic adsorption of chitosan/zeolite/magnetite composite toward Ni(II) follows Ho dan Mckay pseudo second order equation with the value of rate constant (k) was 3.9514×10^{-2} g/mg.minute while adsorption isotherm follows Langmuir equation with capacity of adsorption (Q_0) was 14.4093 mg/g or 2.4544×10^{-4} mol/g. Recovery examination showed that chitosan/zeolite/magnetite composite can be separate well from solution by using external magnetic than chitosan or zeolite.

Keywords: Chitosan, zeolite, magnetite, composite, Ni(II) adsorption.