

KOMPOSIT BENTONIT-MAGNETIT-ALGINAT SEBAGAI ADSORBEN ZAT WARNA KATIONIK KRISTAL VIOLET

Mar'atussolihah
19/445672/PA/19496

INTISARI

Modifikasi bentonit dengan magnetit dan alginat untuk adsorpsi zat warna kationik kristal violet telah berhasil dilakukan. Tujuan penelitian ini yaitu mendapatkan komposit bentonit-magnetit-alginat, mengetahui kondisi optimum proses adsorpsi dan memahami kinetika serta isoterm adsorpsi. Penelitian ini dilakukan dengan mensintesis bentonit-magnetit melalui metode kopresipitasi dan memodifikasi bentonit-magnetit dengan alginat serta penambahan larutan CaCl_2 sebagai agen pengikat silang. Komposit dikarakterisasi dengan FTIR, XRD dan SEM-EDX. Kajian adsorpsi dilakukan berdasarkan pengaruh variasi pH, massa adsorben, waktu kontak dan konsentrasi awal zat warna kristal violet. Konsentrasi zat warna kristal violet sebelum dan sesudah adsorpsi diukur menggunakan spektrofotometer *UV-Visible* pada panjang gelombang 590 nm.

Hasil karakterisasi menunjukkan bahwa modifikasi bentonit, magnetit dan alginat berhasil dilakukan. Adsorpsi zat warna kristal violet dengan adsorben bentonit-magnetit-alginat memiliki kapasitas adsorpsi maksimum sebesar 332,95 mg g^{-1} yang terjadi pada kondisi pH 4, massa adsorben 0,030 gram, waktu kontak 120 menit, dan konsentrasi awal adsorbat 800 ppm. Proses adsorpsi zat warna kristal violet dengan adsorben bentonit-magnetit-alginat mengikuti kinetika orde dua semu dengan konstanta laju reaksi $1,095 \times 10^{-3} \text{ g mg}^{-1} \text{ menit}^{-1}$ dan model isoterm Dubinin-Radushkevich dengan energi adsorpsi sebesar $1,195 \times 10^{-2} \text{ kJ mol}^{-1}$.

Kata kunci: adsorpsi, alginat, bentonit, kristal violet dan magnetit.

BENTONITE-MAGNETITE-ALGINATE COMPOSITE AS ADSORBENT OF CRYSTAL VIOLET CATIONIC DYE

Mar'atussolihah
19/445672/PA/19496

ABSTRACT

Modification of bentonite with magnetite and alginate for adsorption of cationic crystal violet dye has been conducted. This research aimed to obtain bentonite-magnetite-alginate composites, determine the optimum conditions for adsorption process and understand the kinetics and isotherms adsorption. This research was carried out by synthesizing bentonite magnetite through the coprecipitation method and modifying the bentonite magnetite with alginate and adding CaCl_2 solution as a crosslinking agent. The composite was characterized by FTIR, XRD and SEM-EDX. Adsorption studies were carried out based on the influence of pH variations, adsorbent mass, contact time and initial concentration of crystal violet dye. The concentration of crystal violet dye before and after adsorption was measured using a UV-Visible spectrophotometer at a wavelength of 590 nm.

The characterization results showed that the modification of bentonite with magnetite and alginate was successful. Adsorption of crystal violet dye with bentonite-magnetite-alginate adsorbent has a maximum adsorption capacity 332.95 mg g^{-1} which occurs under conditions pH 4, adsorbent mass 0.030 grams, contact time 120 minutes, and initial adsorbate concentration 800 ppm. The adsorption process of crystal violet dye with bentonite-magnetite-alginate adsorbents followed pseudo second order kinetics with a reaction rate constant of $1.095 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$ and Dubinin-Radushkevich isotherm model with an adsorption energy $1.195 \times 10^{-2} \text{ kJ mol}^{-1}$.

Key words: adsorption, alginate, bentonite, crystal violet and magnetite.