

ABSTRAK

Metilen biru merupakan zat warna sintetik yang umumnya digunakan pada industri tekstil. Limbah metilen biru yang dibuang ke badan air tanpa diolah mengakibatkan pencemaran bagi lingkungan. Salah satu metode pengolahan limbah adalah adsorpsi. Hidrotalsit merupakan adsorben dengan kapasitas adsorpsi yang besar. Hidritalsit adalah lempung anionik yang terdiri dari tumpukan lapisan bermuatan positif, biasanya kation logam divalen (+2) dan trivalen (+3), dan mempunyai anion diantara lapisan tersebut. Penelitian ini bertujuan untuk mengetahui metode sintesis hidrotalsit Zn/Al-Oksalat dan hasil karakterisasinya dilakukan perbandingan dengan hidrotalsit Zn/Al-NO₃, mengetahui kondisi optimum hidrotalsit Zn/Al-Oksalat dalam mengadsorpsi zat warna metilen biru serta mengetahui model kinetika dan isoterm adsorpsi. Hidrotalsit Zn/Al-Oksalat berhasil disintesis dengan metode kopresipitasi dan dilanjutkan proses hidrotermal pada suhu 120 °C selama 20 jam. Hidrotalsit Zn/Al-Oksalat hasil sintesis dikarakterisasi menggunakan FTIR dan XRD. Kondisi optimum hidrotalsit Zn/Al-Oksalat dalam mengadsorpsi zat warna metilen biru dilakukan dengan metode *batch* pada pH optimum 7, waktu kontak 60 menit, berat adsorben 80 mg dan konsentrasi metilen biru 20 mg/L. Kinetika adsorpsi hidrotalsit Zn/Al-Oksalat dalam mengadsorpsi metilen biru mengikuti model pseudo orde dua dengan nilai $R^2 = 0,9996$ dan $k = 0,2047$ mg/g.menit dan isoterm adsorpsinya mengikuti model isoterm adsorpsi Langmuir dengan nilai $R^2 = 0,9904$, $q_m = 19,8413$ mg/g dan $k_L = 2,913$ L/mg.

Kata Kunci: Hidrotalsit, isoterm adsorpsi, kinetika adsorpsi, metilen biru

ABSTRACT

Methylene blue is a synthetic dye that is generally used in the textile industry. Methylene blue waste that is dumped into water bodies without being treated causes environmental pollution. One method of waste processing is adsorption. Hydrotalcite is an adsorbent with a large adsorption capacity. Hydrotalcite is an anionic clay consisting of a stack of positively charged layers, usually divalent (+2) and trivalent (+3) metal cations, and has anions between the layers. This research aims to determine the synthesis method Zn/Al-Oxalate hydrotalcite and compare the characterization results with Zn/Al-NO₃ hydrotalcite, determine the optimum conditions for Zn/Al-Oxalate hydrotalcite in adsorbing methylene blue dye and determine the kinetic model and adsorption isotherm. Zn/Al-Oxalate hydrotalcite was successfully synthesized using the coprecipitation method and continued with the hydrothermal process at a temperature of 120 °C for 20 hours. The synthesized Zn/Al-Oxalate hydrotalcite was characterized using FTIR and XRD. The optimum conditions for Zn/Al-Oxalate hydrotalcite in adsorbing methylene blue dye were carried out using the batch method at optimum pH 7, contact time 60 minutes, adsorbent weight 80 mg and methylene blue concentration 20 mg/L. The adsorption kinetics of Zn/Al-Oxalate hydrotalcite in adsorbing methylene blue follows a pseudo second order model with a value of $R^2 = 0.9996$ and $k = 0.2047$ mg/g.minute and the adsorption isotherm follows the Langmuir adsorption isotherm model with a value of $R^2 = 0.9904$, $q_m = 19.8413$ mg/g and $k_L = 2.913$ L/mg.

Keywords: hydrotalcite, adsorption isotherm, adsorption kinetics, methylene blue

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