ABSTRAK

Methyl orange merupakan zat warna anionik yang berbahaya terhadap lingkungan, sehingga harus dilakukan pengolahan terlebih dahulu sebelum dibuang. Salah satu metode pengolahan zat warna *methyl orange* adalah adsorpsi. Hidrotalsit merupakan senyawa yang memiliki lapisan positif bertumpuk dengan anion pada antar lapisnya. Hidrotalsit digunakan sebagai adsorben karena memiliki kapasitas adsorpsi yang besar. Penelitian ini bertujuan untuk mempelajari adsorpsi zat warna *methyl orange* menggunakan hidrotalsit Co/Fe-CO_3 dengan parameter uji meliputi pH, waktu kontak, massa adsorben, dan konsentrasi methyl orange serta mengetahui model kinetika dan isoterm adsorpsi. Sintesis hidrotalsit Co/Fe-CO_3 dilakukan melalui metode kopresipitasi dengan perbandingan mol ion Co^{2+} dan ion Fe^{3+} sebesar 4:1 kemudian dilanjutkan hidrotermal pada suhu 65 ^oC selama 24 jam. Senyawa hasil sintesis dikarakterisasi menggunakan spektrofotometer *Fourier Transform Infra Red* (FTIR) dan *X-Ray Diffraction* (XRD). Kondisi optimum adsorpsi *methyl orange* oleh hidrotalsit Co/Fe-CO_3 diperoleh pada pH 6, waktu kontak 60 menit, massa adsorben 50 mg, dan konsentrasi *methyl orange* 80 mg/L. Kinetika adsorpsi zat warna *methyl orange* pada hidrotalsit Co/Fe-CO_3 mengikuti kinetika pseudo orde dua dengan nilai R^2 sebesar 0,9998; konstanta laju adsorpsi sebesar 0,025 g/mg.menit; dan nilai q_e sebesar 13,793 mg/g. Model isoterm adsorpsi mengikuti model isoterm Freundlich dengan nilai R^2, n, K_F, dan E masing-masing sebesar 0,9969; 0,781; 3,073 mg/g; dan -2,781 kJ/mol.

Kata kunci: hidrotalsit Co/Fe-CO_3, adsorpsi, *methyl orange*, kinetika, isoterm

ABSTRACT

Methyl orange is an anionic dye that is harmful to the environment, so it must be processed before disposal. One method of treatment for methyl orange dye is adsorption. Hydrotalcite is a compound that has a positive layer stacked with anions between the layers. Hydrotalcite is used as an adsorbent because it has a large adsorption capacity. This research aims to study the adsorption of methyl orange dye using hydrotalcite Co/Fe-CO_3 with test parameters including pH, contact time, adsorbent mass, and methyl orange concentration, and knowing the kinetic model and adsorption isotherm. Synthesis of hydrotalcite Co/Fe-CO_3 was carried out by coprecipitation method with a mole ratio of Co^{2+} ions and Fe^{3+} ions of 4:1 and then continued hydrothermal at 65 ^oC for 24 hours. The synthesis compounds were tested using Fourier Transform Infra-Red (FTIR) and X-Ray Diffraction (XRD) spectrophotometer. The optimum conditions for adsorption of methyl orange by hydrotalcite Co/Fe-CO_3 were pH 6, contact time of 60 minutes, the adsorbent mass of 50 mg, and concentration of methyl orange of 80 mg/L. The adsorption kinetics of methyl orange dye on hydrotalcite Co/Fe-CO_3 followed pseudo-second-order kinetics with an R^2 value of 0,9998; an adsorption rate constant of 0,025 g/mg.minute; and a qe value of 13,793 mg/g. The adsorption isotherm model follows the Freundlich isotherm model with R^2, n, K_F, and E values of 0,9969; 0,781; 3,073 mg/g; and -2,781 kJ/mol, respectively.

Keywords: *hydrotalcite Co/Fe-CO_3, adsorption, methyl orange, kinetic, isotherm*