

SINTESIS KOMPOSIT ASAM HUMAT-KITIN/MAGNETIT SEBAGAI ADSORBEN METILEN BIRU

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INTISARI

Sintesis komposit asam humat-kitin/magnetit (AH-kitin/magnetit) sebagai adsorben metilen biru telah dilakukan. Penelitian ini bertujuan untuk mensintesis komposit AH-kitin/magnetit dan mengkaji mekanisme adsorpsi metilen biru oleh adsorben AH-kitin/magnetit dalam kondisi pH optimum.

Sintesis komposit AH-kitin/magnetit meliputi ekstraksi asam humat dari tanah gambut melalui ekstraksi alkali, imobilisasi asam humat dengan kitin, dan sintesis AH-kitin/magnetit dengan metode kopresipitasi secara *ex situ* dalam kondisi basa. Keberhasilan sintesis komposit dibuktikan dengan karakterisasi AH-kitin/magnetit menggunakan FTIR, XRD, dan VSM. Kajian adsorpsi metilen biru oleh AH-kitin/magnetit mencakup variasi pH, pH_{PZC} , kinetika adsorpsi, isoterm adsorpsi, dan energi adsorpsi. Konsentrasi metilen biru dalam larutan dianalisis menggunakan Spektrofotometer UV-Vis pada λ_{max} 664 nm.

Hasil karakterisasi menunjukkan bahwa sintesis komposit AH-kitin/magnetit telah berhasil dilakukan. Hasil kajian adsorpsi metilen biru oleh AH-kitin/magnetit menunjukkan adsorpsi optimum pada pH 11 dan diperkuat dengan pH_{PZC} 4,8. Adsorpsi metilen biru oleh AH-kitin/magnetit mengikuti model kinetika orde kedua-semu oleh Ho-McKay dengan konstanta laju adsorpsi sebesar $0,314 \text{ g mg}^{-1} \text{ min}^{-1}$. Isoterm adsorpsi mengikuti model isoterm Langmuir dengan kapasitas adsorpsi sebesar $38,314 \text{ mg g}^{-1}$ dan nilai konstanta Langmuir $58176,63 \text{ L mol}^{-1}$ serta energi adsorpsi sebesar $27,18 \text{ kJ mol}^{-1}$.

Kata kunci: adsorpsi, komposit AH-kitin/magnetit, metilen biru

SYNTHESIS OF HUMIC ACID-CHITIN/MAGNETITE COMPOSITE AS ADSORBENT OF METHYLENE BLUE

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ABSTRACT

Synthesis of a humic acid-chitin/magnetite (HA-chitin/magnetite) composite as an adsorbent for methylene blue has been successfully conducted. The study aimed to synthesize the composite material and analyze the adsorption mechanism of methylene blue on HA-chitin/magnetite adsorbent under optimal pH conditions.

Synthesis of HA-chitin/magnetite composite involved the extraction of humic acid from peat soil using an alkali extraction method, immobilization of humic acid with chitin, and ex-situ coprecipitation synthesis of HA-chitin/magnetite under basic condition. The successful synthesis of the composite material was confirmed through characterization using FTIR, XRD, and VSM. The adsorption study of methylene blue onto HA-chitin/magnetite included variations of pH, pH at the point of zero charge (pH_{PZC}), adsorption kinetics, adsorption isotherms and adsorptions energy. The concentration of methylene blue in the solution was analyzed using UV-Vis spectrophotometry at λ_{max} 664 nm.

Characterization results indicated the successful synthesis of HA-chitin/magnetite composite. The adsorption study revealed optimum adsorption at pH 11, supported by a pH_{PZC} of approximately 4.8. Methylene blue adsorption onto HA-chitin/magnetite followed a pseudo-second-order kinetic model Ho-McKay, with an adsorption rate constant of $0.314 \text{ g mg}^{-1} \text{ min}^{-1}$. The adsorption isotherm conformed to the Langmuir model with an adsorption capacity of 38.314 mg g^{-1} , a Langmuir constant of $58176.63 \text{ L mol}^{-1}$ and an adsorption energy of $27.18 \text{ kJ mol}^{-1}$.

Keyword: adsorption, HA-chitin/magnetite composite, methylene blue