

SINTESIS MEMBRAN KITOSAN-ASAM HUMAT SEBAGAI ADSORBEN *MALACHITE GREEN*

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INTISARI

Penelitian tentang sintesis membran Kitosan-Asam humat (KAH) sebagai adsorben *malachite green* (MG) telah dilakukan. Langkah pertama dalam penelitian ini adalah sintesis membran KAH. Membran yang dihasilkan kemudian dianalisis menggunakan FTIR untuk identifikasi gugus fungsi dan SEM untuk menganalisis permukaan membran sebelum dan sesudah adsorpsi MG. Parameter pengujian kualitas membran yang dihasilkan sebagai adsorben MG diantaranya uji ketahanan dalam medium asam dan basa, pengaruh komposisi, waktu kontak, pH larutan, konsentrasi awal, kinetika adsorpsi, isoterm adsorpsi serta kajian desorpsinya.

Data FTIR menunjukkan puncak serapan FTIR membran KAH menunjukkan kemiripan dengan berbagai puncak material penyusunnya, diantaranya keberadaan gugus -OH pada daerah 3448 cm^{-1} , gugus -NH₂ pada daerah vibrasi 1635 cm^{-1} , gugus C=C aromatis yang terdeteksi pada daerah 1381 cm^{-1} dan gugus C-O *stretching* yang terdeteksi pada daerah 1087 cm^{-1} . Data SEM setelah adsorpsi menunjukkan perubahan yang signifikan terhadap permukaan membran yang tertutupi oleh MG. Adsorpsi MG pada membran KAH optimum pada pH 8, waktu kontak 90 menit dan konsentrasi 200 mg L^{-1} . Pola isoterm adsorpsinya mengikuti model Langmuir dengan kapasitas maksimum adsorpsi (q_m) $169,49\text{ mg g}^{-1}$, konstanta Langmuir (K_L) $3,63 \times 10^4\text{ L mol}^{-1}$ dan energi adsorpsi $26,18\text{ kJ mol}^{-1}$. Model kinetika adsorpsi MG pada membran KAH dapat dijelaskan melalui Model pseudo orde dua McKay & Ho dengan harga konstanta laju adsorpsi mencapai $3,30 \times 10^{-2}\text{ mg g}^{-1}\text{ menit}^{-1}$. Kajian desorpsi menunjukkan desorpsi optimal dapat dilakukan menggunakan larutan HCl 1 mM .

Kata kunci: membran, kitosan, asam humat, adsorpsi, *malachite green*.

SYNTHESIS OF CHITOSAN-HUMIC ACID MEMBRANE AS AN ADSORBENT OF MALACHITE GREEN

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ABSTRACT

Research on the synthesis of the chitosan-humic acid membrane as an adsorbent of malachite green has been done. This study started by synthesizing the chitosan-humic acid membrane. Functional groups of the membrane were identified using FTIR. SEM was used to analyze the surface of the membrane before adsorption and after adsorption. Some parameters that represented the quality of membrane has been examined such as medium acidity, composition, contact time, pH, starting concentration, kinetic adsorption, isotherm adsorptions and desorption study.

The result of FTIR analysis shows peak similarities among starting materials. The peak of vibration that showed at 3448 cm^{-1} , 1635 cm^{-1} , 1381 cm^{-1} and 1033 cm^{-1} which indicated the existence of $-\text{OH}$, $-\text{NH}_2$, $\text{C}=\text{C}$ aromatics, and $\text{C}-\text{O}$ stretching, respectively. The SEM results after adsorption show that the surface of the membrane was significantly changed because of MG. Adsorption of MG onto KAH membrane was optimum at pH 8, contact time of 90 minutes and the optimum concentration of 200 mg L^{-1} . Isotherm model of MG adsorption followed Langmuir's model with maximum adsorption capacity (q_m) of 169.49 mg g^{-1} , adsorption constant (K_L) of $3.63 \times 10^4\text{ L mol}^{-1}$ and adsorption energy of 26.18 kJ mol^{-1} . Adsorption kinetics of MG onto KAH membrane was successfully explained with pseudo-two model by McKay & Ho with rate adsorption constant (k) of $3.30 \times 10^{-2}\text{ mg g}^{-1}\text{ min}^{-1}$. Desorption study showed that optimum condition reached with HCl 1 mM solution.

Keywords: membrane, chitosan, humic acid, adsorption, malachite green.