ADSORPSI METIL VIOLET MENGGUNAKAN ADSORBEN SELULOSA-ASAM ASPARTAT TERTAUT SILANG EPIKLOROHIDRIN

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INTISARI

Adsorpsi metil violet (MV) menggunakan adsorben selulosa-asam aspartat tertaut silang epiklorohidrin telah dilakukan. Penelitian ini bertujuan untuk mensintesis adsorben selulosa-asam aspartat tertaut silang epiklorohidrin (S-Asp), menentukan pH optimum, model isoterm, dan kinetika adsorpsi. Selulosa diisolasi dari mahkota nanas melalui proses hidrolisis, delignifikasi, dan *bleaching*. Adsorben S-Asp disintesis dengan menautsilangkan selulosa dengan asam aspartat menggunakan agen penaut silang epiklorohidrin. Adsorben hasil sintesis dikarakterisasi menggunakan FT-IR dan SEM-EDX. Kajian adsorpsi MV oleh adsorben S-Asp dilakukan melalui variasi pH, konsentrasi larutan MV, dan waktu kontak adsorpsi, serta dilakukan uji desorpsi MV menggunakan akuades, HCl 0,1 mM, etanol 40 dan 60%, serta NaCl 0,1 dan 1 M.

Hasil karakterisasi FT-IR menunjukkan bahwa adsorben S-Asp terdiri dari gugus –OH dan –COOH, serta memiliki serapan bilangan gelombang yang mirip dengan selulosa, Morfologi SEM-EDX menunjukkan bahwa adsorben S-Asp memiliki permukaan serat yang tidak teratur dan tidak berpori mirip dengan permukaan selulosa, serta mengandung unsur C, O, N, dan Cl. Adsorben S-Asp relatif stabil pada pH 2-8, adsorpsi optimum MV oleh adsorben S-Asp terjadi pada pH 7. Model isoterm adsorpsi MV mengikuti model isoterm adsorpsi Freundlich dengan nilai K_F dan n sebesar 2,667 L mol^{-1} dan 1,445, sedangkan model kinetika adsorpsi MV mengikuti model kinetika adsorpsi Ho dan McKay dengan nilai konstanta laju adsorpsi sebesar $5{,}28 \times 10^{-4}$ g mg^{-1} $menit^{-1}$. Larutan etanol 60% memiliki kemampuan paling kuat dalam mendesorpsi MV.

Kata kunci: adsorben S-Asp, adsorpsi, desorpsi, metil violet

ADSORPTION OF METHYL VIOLET USING CELLULOSE-ASPARTIC ACID ADSORBENT CROSSLINKED BY EPICHLOROHYDRIN

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ABSTRACT

Adsorption of methyl violet (MV) using cellulose–aspartic acid adsorbent crosslinked by epichlorohydrin has been carried out. This research aims to synthesize cellulose–aspartic acid adsorbent crosslinked by epichlorohydrin (S-Asp), to determine the optimum pH, isotherm models, and kinetics models for the adsorption. Cellulose was extracted from the pineapple crowns using hydrolysis, delignification, and bleaching processes. The adsorbent was prepared by mixing the cellulose with aspartic acid using epichlorohydrin as a crosslinker agent. The adsorbent was also characterized using FT-IR and SEM-EDX. The adsorption of MV was studied under variations of pH, the concentration of MV solution, and adsorption time. The MV desorption test using aquadest, HCl 0,1 mM, 40 and 60% of ethanol, 0,1 and 1 M of NaCl.

The results of characterization using FT-IR showed that the S-Asp adsorbent consisted of –OH and –COOH groups, and had wave number similar to the celluloses. The morphology of the adsorbent using SEM-EDX showed that the adsorbent had formless and amorphous fiber surfaces which similar to the celluloses, and also contained C, O, N, and Cl elements. The adsorbent tended to be stable at pH 2-8, the optimum adsorption of MV occurred at pH 7. The adsorption isotherm model followed the Freundlich isotherm model with the K_F value 2.667 L mol^{-1} and n value 1.445. The adsorption kinetics model followed the Ho and McKay kinetics model with the reaction rate constant of 5.28×10^{-4} g mg^{-1} min^{-1}. 60% of ethanol solution has the strongest ability to desorb MV from the S-Asp adsorbent.

Keywords: adsorption, desorption, methyl violet, S-Asp adsorbent