

ABSTRAK

PELAPISAN PARTIKEL MAGNETIT DAN SILANISASI PADA BIOADSORBEN CANGKANG KELAPA SAWIT (*Elaeis Guinensis Jacq.*) DAN UJI ADSORPSI TERHADAP RHODAMIN B DAN METILEN BIRU

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Pada penelitian ini telah dilakukan modifikasi karbon pirolisis aktif magnetit (KPA-M) dan karbon pirolisis magnetit silan (KPA-MS) dari biokarbon cangkang kelapa sawit yang digunakan sebagai adsorben larutan zat warna Rhodamin B (RhB) dan Metilen Biru (MB). Adsorben hasil sintetis dikarakterisasi menggunakan spektrofotometer inframerah (IR) untuk mengidentifikasi gugus fungsi, *X-ray Diffraction* (XRD) untuk menentukan tingkat kristalin adsorben, *BET-Surface area* untuk menentukan luas pori permukaan karbon dan *Scanning Electron Microscope With Energy Dispersive X-Ray Spectroscopy* (SEM-EDX) untuk menganalisis morfologi adsorben serta komponen dalam karbon. Konsentrasi larutan RhB dan MB dianalisis menggunakan spektrofotometer Ultraviolet-Visible (UV-Vis). Adsorpsi larutan RhB oleh adsorben KPA-M dan KPA-MS optimum pada dosis 0,4 g dengan waktu kontak masing-masing selama 60 dan 30 menit pada pH 9. Adsorpsi larutan MB oleh KPA-M dan KPA-MS masing-masing optimum pada dosis 0,2 dan 0,4 g pada waktu kontak 60 menit dan pH 10. Laju adsorpsi zat warna RhB dan MB cenderung mengikuti model kinetika pseudo orde dua. Isoterm adsorpsi cenderung mengikuti model isoterm Freundlich. Desorpsi metilen biru dari KPA-M menggunakan eluen HCl dan etanol, sedangkan KPA-MS menggunakan akuades dan KNO₃. Adsorben KPA-M dan KPA-MS dapat digunakan secara berulang untuk mengadsorpsi metilen biru sebanyak 5 kali siklus pengulangan dengan persentase adsorpsi >80%.

Kata kunci : Cangkang kelapa sawit, adsorpsi, rhodamin B, metilen biru, KPA-M dan KPA-MS

ABSTRAK

COATING OF MAGNETITE PARTICLES AND SILANIZATION ON OIL PALM SHELL (*Elaeis guineensis* Jacq)-BASED BIOADSORBENT AND ADSORPTION TEST ON RHODAMINE B AND METHYLENE BLUE

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In this study, modification of activated magnetite pyrolysis carbon (KPA-M) and silane magnetite pyrolysis carbon (KPA-MS) from palm shell biocarbon was carried out which was used as an adsorbent for Rhodamine B (RhB) and Methylene Blue (MB) dye solutions. The synthetic adsorbents were characterized using an infrared (IR) spectrophotometer to identify functional groups, X-ray Diffraction (XRD) to determine the level of adsorbent crystallinity, BET-Surface area to determine the surface pore area of the carbon and Scanning Electron Microscope With Energy Dispersive X-Ray Spectroscopy (SEM-EDX) to analyze the morphology of the adsorbent and the components in the carbon. The concentration of RhB and MB solutions was analyzed using an Ultraviolet-Visible (UV-Vis) spectrophotometer. The adsorption of RhB solution by KPA-M and KPA-MS adsorbents was optimum at a dose of 0.4 g with a contact time of 60 and 30 minutes respectively at pH 9. The adsorption of MB solution by KPA-M and KPA-MS was optimum at a dose of 0.2 and 0.4 g respectively at a contact time of 60 minutes and pH 10. The adsorption rate of RhB and MB dyes tended to follow the pseudo-second-order kinetic model. The adsorption isotherm tended to follow the Freundlich isotherm model. Desorption of methylene blue from KPA-M used HCl and ethanol as eluents, while KPA-MS used aquadest and KNO₃. The KPA-M and KPA-MS adsorbents can be used repeatedly to adsorb methylene blue for 5 repetition cycles with an adsorption percentage of >80%.

Keywords: Oil palm shell, adsorption, Rhodamine B, Methylene Blue, KPA-M, KPA-MS