

ABSTRACT

MODIFICATION OF CELLULOSE FROM OIL PALM EMPTY FRUIT BUNCH (*Elaeis Guineensis* Jacq) BY MAGNETITE COATING TECHNIQUE AND ADSORPTION TEST ON METHYLENE BLUE DYE

By

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In this study involved the isolation of cellulose from oil palm empty fruit bunch (*Elaeis Guineensis* Jacq), which was subsequently modified by magnetite coating through the addition of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ compounds to produce pure cellulose-magnetite and fiber cellulose-magnetite as methylene blue adsorbents. The adsorbents were characterized using Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups, X-Ray Diffraction (XRD) to determine crystallinity, and Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX) to analyze surface morphology and elemental composition. The optimum adsorption of methylene blue occurred at pH 8 (pure cellulose), 9 (fiber cellulose), 8 (pure cellulose-magnetite), and 5 (fiber cellulose-magnetite). The optimum contact time between the adsorbents and methylene blue was found to be 15 minutes (pure cellulose), 60 minutes (fiber cellulose), 90 minutes (pure cellulose-magnetite), and 30 minutes (fiber cellulose-magnetite), with an optimum concentration of 200 ppm. The adsorption kinetics of methylene blue tended to follow pseudo-second-order kinetics, and the adsorption isotherms tended to fit the Freundlich model.

Keywords: Adsorption, cellulose, oil palm empty fruit bunch, magnetite, methylene blue.

ABSTRAK

MODIFIKASI SELULOSA DARI SABUT KELAPA SAWIT (*Elaeis Guineensis Jacq*) DENGAN TEKNIK PELAPISAN MAGNETIT SERTA UJI ADSORPSI TERHADAP ZAT WARNA METILEN BIRU

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Pada penelitian ini telah dilakukan pemisahan selulosa dari sabut kelapa sawit (*Elaeis Guineensis Jacq*) yang kemudian dimodifikasi dengan pelapisan magnetit melalui penambahan senyawa $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ dan $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ untuk menghasilkan selulosa magnetit sebagai adsorben zat pewarna metilen biru. Adsorben tersebut dikarakterisasi menggunakan spektrofotometer *Fourier Transform Infra-Red* (FTIR) untuk mengidentifikasi gugus fungsi, *X-Ray Diffraction* (XRD) untuk mengidentifikasi tingkat kristalinitas, dan *Scanning Electron Microscope-Energy Dispersive X-Ray* (SEM-EDX) untuk mengetahui morfologi permukaan dan mengidentifikasi komposisi unsur yang terkandung dalam adsorben. Adsorpsi zat pewarna metilen biru pada selulosa murni, selulosa sabut, SMM, dan SSM optimum pada masing-masing pH 8, 9, 8 dan 5. Waktu kontak optimum antara adsorben dengan metilen biru adalah 15 menit (selulosa murni), 60 menit (selulosa sabut), 90 menit (SMM), dan 30 menit (SSM) dengan konsentrasi optimum 200 ppm. Kinetika adsorpsi metilen biru cenderung mengikuti kinetika pseudo orde dua dan isoterm adsorpsi metilen biru cenderung mengikuti isoterm Freundlich.

Kata kunci: Adsorpsi, selulosa, sabut kelapa sawit, magnetit, dan metilen biru.