

ABSTRACT

STUDY ADSORPTION OF METHYLENE BLUE DYE BY *Nitzschia* sp. BIOMASS IMMOBILIZED ON SILICA-MAGNETITE (Fe₃O₄)

By

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This study has been synthesized of hybrid algae silica (HAS) and the hybrid algae silica magnetite from biomass *Nitzschia* sp algae (HASM). Material synthesis product is characterized using *infrared* spectrometer (*IR*) to identify functional groups, *X-Ray Diffraction (XRD)* to determine crystallography of HAS and HASM, *Scanning Electron Microscopy With Energy Dispersive X-ray (SEM-EDX)* to analyze the surface morphology and the constituent element. Adsorption methylene blue in HAS and HASM, chemical stability and ability to reuse was conducted using batch. The results of adsorption methylene blue by HAS and HASM was analyzed by *UV-Visible (UV-Vis)* spectrophotometer. The interactions of methylene blue with HAS and HASM optimum at pH 7 and 6 with methylene blue adsorbed by 97,891 and 98,431%. The kinetic data conformed to the pseudo second order kinetic model with the reaction rate of HAS and HASM respectively $3,21 \times 10^{-4}$ and $7,24 \times 10^{-4} \text{ g mg}^{-1} \text{ minute}^{-1}$, isotherm adsorption conformed to the Freundlich isotherm model.

Key word: *Nitzschia* sp, Silica, TEOS, Hybrid Algae Silica, Magnetite, Methylene Blue

ABSTRAK

STUDI ADSORPSI ZAT WARNA METILEN BIRU OLEH BIOMASSA *Nitzschia* sp. YANG DIIMMOBILISASI DENGAN SILIKA-MAGNETIT (Fe₃O₄)

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Pada penelitian ini telah dilakukan sintesis hibrida alga silika (HAS) dan hibrida alga silika magnetit (HASM) dari biomassa alga *Nitzschia* sp. Material hasil sintesis dikarakterisasi dengan menggunakan Spektrofotometer *Infrared (IR)* untuk mengidentifikasi gugus fungsi, *X-Ray Diffraction (XRD)* untuk menentukan tingkat kekristalan dari HASM dan *Scanning Electron Microscopy With Energi Dispersive X-Ray (SEM-EDX)* untuk menganalisis morfologi permukaan dan konstituen unsur. Adsorpsi metilen biru pada HAS dan HASM dilakukan dengan metode batch untuk mengetahui pH optimum, dan parameter adsorpsi metilen biru pada adsorben HAS dan HASM. Hasil adsorpsi metilen biru oleh HAS dan HASM dianalisis dengan spektrofotometer *UV-Visible (UV-Vis)*. Interaksi metilen biru dengan HAS dan HASM optimum pada pH 7 dan 6 dengan metilen biru teradsorpsi sebesar 97,891 dan 98,431% . Data kinetika adsorpsi metilen biru pada HAS dan HASM cenderung mengikuti model kinetika pseudo orde dua dengan laju adsorpsi masing-masing sebesar $3,21 \times 10^{-4}$ dan $7,24 \times 10^{-4}$ g mg⁻¹ menit⁻¹ sedangkan isoterm adsorpsi metilen biru pada HAS dan HASM cenderung mengikuti model isoterm Freundlich.

Kata kunci : *Nitzschia* sp, Silika, TEOS, Hibrida Alga Silika, Magnetit, Metilen Biru