

**MODIFIKASI SELULOSA DENGAN OKTANOIL KLORIDA SEBAGAI
ADSORBEN SURFAKTAN DODESILBENZENA SULFONAT UNTUK
ADSORPSI LIMBAH LAUNDRY**

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INTISARI

Telah dilakukan penelitian tentang modifikasi selulosa dengan oktanoil klorida sebagai adsorben surfaktan DBS untuk adsorpsi limbah *laundry*. Penelitian ini bertujuan untuk melakukan modifikasi dan karakterisasi adsorben berbasis serbuk selulosa termodifikasi oktanoil klorida (SOK), menentukan kondisi optimum adsorpsi surfaktan DBS berdasarkan pengaruh pH, massa adsorben, waktu kontak, dan konsentrasi awal surfaktan DBS, mempelajari kinetika dan model isoterm adsorpsi surfaktan DBS menggunakan SOK. Adsorben SOK disintesis dari serbuk α -selulosa (SS) dengan oktanoil klorida dalam pelarut N,N-Dimetilformamida (DMF). SS dan SOK yang diperoleh dikarakterisasi dengan spektrofotometer FTIR, XRD, dan SEM. Kajian adsorpsi dilakukan dengan variasi pH larutan, massa adsorben, waktu kontak, dan konsentrasi awal surfaktan DBS. Konsentrasi surfaktan DBS setelah adsorpsi ditentukan dengan spektrofotometri *UV-Visible* pada panjang gelombang 625 nm.

Berdasarkan penelitian, hasil karakterisasi FTIR, XRD, dan SEM yang diperoleh menunjukkan modifikasi selulosa dengan oktanoil klorida berhasil dilakukan. Adsorpsi terhadap surfaktan DBS mencapai optimum pada pH 3, massa adsorben 150 mg, waktu kontak 60 menit, dan konsentrasi awal 150 mg g⁻¹. Proses adsorpsi surfaktan DBS mengikuti orde kedua semu dengan konstanta laju $5,6 \times 10^{-3}$ g mg⁻¹ menit⁻¹ dan mengikuti isoterm Langmuir dengan kapasitas adsorpsi 68,9 mg g⁻¹ dan energi adsorpsi sebesar 24,90 kJ mol⁻¹. Kajian terhadap limbah *laundry* dilakukan dan diperoleh adsorben efektif adalah adsorben selulosa termodifikasi oktanoil klorida sebesar 90,18%.

Kata kunci: adsorpsi, oktanoil klorida, selulosa, dan surfaktan DBS

***MODIFICATION OF CELLULOSE WITH OCTANOYL CHLORIDE AS AN
DODECYLBENZENE SULFONATE SURFACTANT ADSORBENT FOR
LAUNDRY WASTE ADSORPTION***

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ABSTRACT

This research focuses on modifying cellulose with octanoyl chloride as an adsorbent for DBS surfactant in *laundry* wastewater. The objectives of this study were to change and characterize a powder-based adsorbent, cellulose modified with octanoyl chloride (CMOC), determine the optimal conditions for DBS surfactant adsorption based on pH, adsorbent mass, contact time, and initial DBS surfactant concentration, investigate the kinetics and isotherm models of DBS surfactant adsorption using CMOC. CMOC adsorbent was synthesized from α -cellulose powder (CP) using octanoyl chloride in N,N-dimethylformamide (DMF) solvent. CP and CMOC were characterized using FTIR spectroscopy, XRD, and SEM. The adsorption study was conducted by varying the pH of the solution, adsorbent mass, contact time, and initial DBS surfactant concentration. The concentration of DBS surfactant after adsorption was determined using UV-Visible spectrophotometry at a wavelength of 625 nm.

Based on the research findings, the characterization results from FTIR, XRD, and SEM confirmed the successful modification of cellulose with octanoyl chloride. The optimum adsorption of DBS surfactant was achieved at pH 3, with an adsorbent mass of 150 mg, a contact time of 60 minutes, and an initial concentration of 150 mg g⁻¹. The adsorption process followed pseudo-second-order kinetics with a rate constant of 5.6×10⁻³ g mg⁻¹ min⁻¹ and followed the Langmuir isotherm with an adsorption capacity of 68.9 mg g⁻¹ and an adsorption energy of 24.90 kJ mol⁻¹. The study on *laundry* wastewater showed that the effective adsorbent was CMOC, with a removal efficiency of 90.18%.

Keywords: adsorption, cellulose, DBS surfactant, and octanoyl chloride