

SELULOSA TERMODIFIKASI ANHIDRIDA HEKSANOAT SEBAGAI ADSORBEN SURFAKTAN DODESIL BENZENA SULFONAT

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INTISARI

Surfaktan anionik dodesil benzena sulfonat (DBS) merupakan polutan berbahaya yang banyak terkandung pada produk pembersih, seperti detergen pada industri jasa *laundry*. Studi adsorpsi surfaktan DBS dengan selulosa termodifikasi anhidrida heksanoat telah dilakukan. Penelitian ini bertujuan untuk menyintesis adsorben selulosa heksanoat (SH) dan menentukan kondisi optimum adsorpsi DBS oleh adsorben selulosa heksanoat (SH). Penelitian diawali dengan sintesis adsorben selulosa heksanoat (SH). Adsorben dibuat dari reaksi selulosa dan anhidrida heksanoat dengan katalis piridin pada pelarut DMF. Selulosa, SH, dan SH-DBS dikarakterisasi menggunakan FTIR, XRD, serta SEM. Kajian adsorpsi yang dilakukan meliputi variasi pH, waktu kontak, serta konsentrasi awal DBS. Aplikasi adsorben pada detergen dilakukan pada kondisi optimum adsorpsi. Metode analisis *Methylene Blue Active Substances* (MBAS) digunakan untuk penentuan konsentrasi DBS.

Hasil penelitian menunjukkan bahwa sintesis adsorben selulosa heksanoat (SH) berhasil dilakukan. Serapan karakteristik gugus karbonil ester pada FTIR teramati pada bilangan gelombang 1720 cm^{-1} (C=O) dan 1249 cm^{-1} (C–O). Proses adsorpsi DBS terjadi secara optimal pada pH 4, waktu kontak 90 menit, dan konsentrasi awal DBS 100 ppm. Adsorpsi DBS mengikuti model kinetika orde kedua semu dan model isoterm Langmuir dengan kapasitas adsorpsi maksimum 119 mg g^{-1} . Efisiensi adsorpsi surfaktan dalam detergen oleh SH sebesar $(60,14 \pm 1,72)\%$ pada kondisi 30 mg adsorben, 30 mL larutan, dan konsentrasi surfaktan dalam detergen sebesar 100 ppm.

Kata kunci: adsorpsi, anhidrida heksanoat, DBS, selulosa.

HEXANOIC ANHYDRIDE MODIFIED CELLULOSE AS ADSORBENT FOR DODECYL BENZENE SULFONATE SURFACTANT

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ABSTRACT

Dodecyl benzene sulfonate (DBS), an anionic surfactant, is a common toxic pollutant in many cleaning products, such as laundry service detergent. An adsorption study of DBS surfactant with hexanoic anhydride-modified cellulose (CH) has been conducted. This research aimed to synthesize cellulose hexanoate (CH) adsorbent and determine the optimum conditions of DBS adsorption. This study started with cellulose hexanoate (CH) synthesis. The adsorbent was made from cellulose and hexanoic anhydride reaction with a pyridine catalyst in the DMF solvent. Cellulose, CH, and CH-DBS were characterized by using FTIR, XRD, and SEM. The adsorption study was carried out by varying the pH, contact time, and initial concentration of DBS. Adsorbent application in detergent was tested at optimum conditions, respectively. The Methylene Blue Active Substances (MBAS) analysis method was used to determine the DBS concentration.

The results showed that cellulose hexanoate (CH) synthesis was successful. The characteristic absorption of the ester carbonyl group in FTIR was observed at 1720 cm^{-1} (C=O) and 1249 cm^{-1} (C-O). The optimum conditions for DBS adsorption were pH 4, 90 min of contact time, and 100 ppm of DBS initial concentration. The DBS adsorption followed pseudo-second-order kinetics and the Langmuir isotherm model with a maximum adsorption capacity of 119 mg g^{-1} . The adsorption efficiency of CH in detergent was $(60.14 \pm 1.72)\%$ at 30 mg of adsorbent, 30 mL of solution, and a concentration of surfactant in the detergent of 100 ppm.

Keywords: adsorption, cellulose, DBS, hexanoic anhydride.