

MODIFIKASI SERAT KAPUK DENGAN OKTANOIL KLORIDA SEBAGAI ADSORBEN SURFAKTAN DODESIL BENZENA SULFONAT

Shalsabila Nur Halizah

20/459324/PA/19985

INTISARI

Studi adsorpsi surfaktan Dodesil Benzena Sulfonat (DBS) dengan serat kapuk termodifikasi oktanoil klorida telah dilakukan. Penelitian ini bertujuan untuk menyintesis adsorben serat kapuk termodifikasi oktanoil klorida, menentukan kondisi optimum adsorpsi DBS oleh adsorben, dan kajian kinetika serta isoterm adsorpsinya. Penelitian diawali dengan serat kapuk yang dimodifikasi menggunakan oktanoil klorida melalui reaksi esterifikasi dengan katalis piridin pada pelarut DMF. Kajian adsorpsi yang dilakukan meliputi variasi pH, massa, waktu kontak, serta konsentrasi awal DBS. Aplikasi adsorben pada surfaktan dilakukan pada kondisi optimum adsorpsi. Metode analisis *Methylene Blue Active Substances* (MBAS) digunakan untuk penentuan konsentrasi. Serat kapuk mentah (SKM), serat kapuk termodifikasi oktanoil klorida (SKOK), dan SKOK setelah adsorpsi DBS (SKOK-DBS) dikarakterisasi menggunakan FTIR, XRD, dan SEM.

Berdasarkan hasil penelitian diperoleh bahwa sintesis adsorben SKOK berhasil dilakukan. Serapan karakteristik gugus karbonil ester pada FTIR teramat pada bilangan gelombang 1735 cm^{-1} (C=O) dan 1056 cm^{-1} (C-O). Proses adsorpsi DBS terjadi secara optimal pada pH 3, massa adsorben 0,075 g, waktu kontak 120 menit, dan konsentrasi awal DBS 200 mg L^{-1} . Adsorpsi DBS mengikuti model kinetika orde kedua semu dengan konstanta laju reaksi $2,76 \times 10^{-3}\text{ g mg}^{-1}\text{ menit}^{-1}$ dan model isoterm Langmuir dengan kapasitas adsorpsi $60,58\text{ mg g}^{-1}$ serta energi adsorpsi sebesar $22,95\text{ kJ mol}^{-1}$.

Kata kunci: adsorpsi, oktanoil klorida, serat kapuk, surfaktan DBS

***MODIFICATION OF KAPOK FIBER WITH OCTANOYL CHLORIDE AS A
DODECYL BENZENE SULFONATE SURFACTANT ADSORBENT***

Shalsabila Nur Halizah

20/459324/PA/19985

ABSTRACT

A study on the adsorption of Dodecyl Benzene Sulfonate (DBS) surfactant using octanoyl chloride–modified kapok fiber has been conducted. This research aims to synthesize octanoyl chloride–modified kapok fiber adsorbent, determine the optimum conditions for DBS adsorption, and study its adsorption kinetics and isotherms. The research was initialized by modifying kapok fiber using octanoyl chloride through esterification reaction with pyridine catalyst in DMF solvent. Adsorption studies through variations in pH, mass, contact time, and initial DBS concentration were then conducted to determine the optimum condition. The adsorbent application on surfactants was carried out under optimum adsorption conditions. The *Methylene Blue Active Substances* (MBAS) analysis method was used to determine the concentration. Raw kapok fiber (SKM), octanoyl chloride–modified kapok fiber (SKOK), and SKOK post DBS adsorption (SKOK–DBS) were characterized using FTIR, XRD, and SEM.

Based on the obtained results, it was found that the synthesis of SKOK adsorbent was successful. The absorption characteristics of ester carbonyl groups in FTIR were observed at wave numbers of 1735 cm^{-1} (C=O) and 1056 cm^{-1} (C–O). The DBS adsorption process occurred optimally at pH 3, adsorbent mass of 0.075 g, contact time of 120 minutes, and initial DBS concentration of 200 mg L^{-1} . The DBS adsorption follows the pseudo–second–order kinetic model with a reaction rate constant of $2.76 \times 10^{-3}\text{ g mg}^{-1}\text{ min}^{-1}$ and the Langmuir isotherm model with an adsorption capacity of 60.58 mg g^{-1} and adsorption energy of 22.95 kJ mol^{-1} .

Keywords: adsorption, DBS surfactant, kapok fiber, octanoyl chloride