

## **PENGOLAHAN CEMARAN ZAT WARNA TEKSTIL REMAZOL BRILLIANT BLUE R (RBBR) MENGGUNAKAN MATERIAL TIOUREA-KITOSAN (TUCTS) SEBAGAI ADSORBEN**

Ika Yuni Astuti  
22/495506/PPA/06306

### **INTISARI**

Penelitian ini berfokus pada penghilangan polusi pewarna tekstil Remazol Brilliant Blue R (RBBR) menggunakan material tiourea-kitosan (TUCTS) sebagai adsorben. Tujuan dari penelitian ini adalah untuk mensintesis material TUCTS dalam bentuk bubuk (TUCTS-P) dan film (TUCTS-F) serta mengevaluasi efektivitasnya dalam mengadsorpsi pewarna RBBR. Parameter kunci yang diuji meliputi pengaruh pH, massa adsorben, waktu kontak, konsentrasi larutan, kinetika adsorpsi, dan isoterm adsorpsi, serta aplikasi TUCTS dalam mengadsorpsi RBBR dari sampel buatan dengan gangguan dari pewarna tekstil lainnya. Penelitian dimulai dengan sintesis dan karakterisasi TUCTS-P dan TUCTS-F menggunakan *Fourier Transform Infrared Spectroscopy* (FT-IR), *X-Ray Diffractometer* (XRD), dan *Scanning Electron Microscopy* dengan *Energy Dispersive X-ray Spectroscopy* (SEM-EDX). Hasil karakterisasi menunjukkan bahwa sintesis TUCTS-P dan TUCTS-F telah berhasil dilakukan.

Kondisi optimum untuk adsorpsi RBBR menggunakan TUCTS-P adalah pH 6, massa adsorben 0,012 g, waktu kontak 45 menit, dan konsentrasi awal RBBR 160 mg L<sup>-1</sup>, dengan kapasitas adsorpsi sebesar 579 mg g<sup>-1</sup>. Untuk TUCTS-F, kondisi optimal adalah pH 6, massa adsorben 0,015 g, waktu kontak 90 menit, dan konsentrasi awal RBBR 200 mg L<sup>-1</sup>, dengan kapasitas adsorpsi sebesar 613 mg g<sup>-1</sup>. Kinetika adsorpsi mengikuti model pseudo-orde dua, dengan konstanta laju adsorpsi (k) sebesar 0,00003 g mg<sup>-1</sup> min<sup>-1</sup> untuk TUCTS-P dan 0,0005 g mg<sup>-1</sup> min<sup>-1</sup> untuk TUCTS-F. Isoterm adsorpsi sesuai dengan model Langmuir, dengan kapasitas adsorpsi maksimum (q<sub>m</sub>) sebesar 556 mg g<sup>-1</sup> untuk TUCTS-P dan 667 mg g<sup>-1</sup> untuk TUCTS-F.

Kata kunci: adsorpsi, tiourea-kitosan, remazol brilliant blue R

## **REMOVAL OF REMAZOL BRILLIANT BLUE R (RBBR) TEXTILE DYE POLLUTION USING THIOUREA-CHITOSAN MATERIAL AS AN ADSORBENT**

Ika Yuni Astuti

22/495506/PPA/06306

### **ABSTRACT**

This research focuses on the removal of Remazol Brilliant Blue R (RBBR) textile dye pollution using thiourea-chitosan material (TUCTS) as an adsorbent. The aim of this research was to synthesize TUCTS in powder (TUCTS-P) and film (TUCTS-F) forms and evaluate their effectiveness in adsorbing RBBR dye. Key parameters examined included the effects of pH, adsorbent mass, contact time, solution concentration, adsorption kinetics, and isotherms, as well as the application of TUCTS in adsorbing RBBR from synthetic samples with interference from other textile dyes. The study begins with the synthesis and characterization of TUCTS-P and TUCTS-F using Fourier Transform Infrared Spectroscopy (FT-IR), X-ray diffraction (XRD), and Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy (SEM-EDX). The characterization results confirmed that the synthesis of TUCTS-P and TUCTS-F had been successfully carried out.

Optimal conditions for RBBR adsorption using TUCTS-P were pH 6, 0.012 g adsorbent mass, 45-minute contact time, and an initial RBBR concentration of 160 mg L<sup>-1</sup>, achieving an adsorption capacity of 579 mg g<sup>-1</sup>. For TUCTS-F, optimal conditions were pH 6, 0.015 g adsorbent mass, 90-minute contact time, and an initial RBBR concentration of 200 mg L<sup>-1</sup>, with an adsorption capacity of 613 mg g<sup>-1</sup>. Adsorption kinetics followed a pseudo-second-order model, with rate constants (k) of 3×10<sup>-5</sup> g mg<sup>-1</sup> min<sup>-1</sup> for TUCTS-P and 5×10<sup>-4</sup> g mg<sup>-1</sup> min<sup>-1</sup> for TUCTS-F. The adsorption isotherms adhered to the Langmuir model, with maximum monolayer adsorption capacities (q<sub>m</sub>) of 556 mg g<sup>-1</sup> for TUCTS-P and 667 mg g<sup>-1</sup> for TUCTS-F.

**Keywords:** adsorption, thiourea-chitosan, remazol brilliant blue R