

STUDI ADSORPSI REMAZOL BRILLIANT VIOLET 5R PADA KAIN KATUN YANG DIMODIFIKASI DENGAN 3-CHLORO-2- HYDROXYPROPYL TRIMETHYLAMMONIUM CHLORIDE

Luthfita Keysha Aulia Giharto
21/482092/PA/21020

INTISARI

Penelitian tentang adsorpsi adsorbat *Remazol Brilliant Violet 5R* (RBV-5R) dengan adsorben kain katun termodifikasi *3-Chloro-2-Hydroxypropyl Trimethylammonium Chloride* (CHPTAC) telah dilakukan. Penelitian ini bertujuan untuk mengkarakterisasi adsorben kain katun termodifikasi CHPTAC, menentukan kondisi optimum pH, massa adsorben, waktu kontak, dan konsentrasi adsorbat. CHPTAC diubah terlebih dahulu menjadi EPTAC dengan penambahan NaOH sebelum berinteraksi dengan serat kain katun. Hasil kain katun termodifikasi CHPTAC kemudian dikarakterisasi menggunakan FTIR dan SEM-EDX. Kajian adsorpsi kain katun termodifikasi CHPTAC dengan RBV-5R melibatkan variasi pH, massa adsorben, waktu kontak, dan konsentrasi adsorbat. Variasi waktu kontak digunakan untuk menentukan kinetika adsorpsi, sedangkan variasi konsentrasi awal RBV-5R digunakan untuk menentukan isoterm adsorpsi. Selanjutnya, dilakukan kajian desorpsi atau pelepasan kembali pewarna RBV-5R dari adsorben kain katun termodifikasi CHPTAC, melalui variasi jenis larutan dan variasi waktu pada saat proses desorpsi.

Hasil penelitian menunjukkan bahwa modifikasi kain katun dengan CHPTAC telah berhasil dilakukan. Interaksi optimum RBV-5R dengan adsorben kain katun termodifikasi CHPTAC terjadi pada pH 4, massa adsorben 50 mg, waktu kontak selama 30 menit dan konsentrasi awal adsorbat sebesar 300 mg L⁻¹. Adsorpsi RBV-5R dengan adsorben kain katun termodifikasi CHPTAC mengikuti model kinetika orde dua semu dengan nilai konstanta laju adsorpsi sebesar 8,41×10⁻² g mg⁻¹ menit⁻¹ dan model isoterm Langmuir dengan kapasitas adsorpsi maksimum sebesar 86,95 mg g⁻¹. Larutan optimal untuk desorpsi RBV-5R pada kain katun termodifikasi CHPTAC adalah larutan NaSCN dengan persentase desorpsi sebesar 92% dan waktu kontak optimum selama 120 menit.

Kata kunci: adsorpsi, kain katun, Remazol Brilliant Violet 5R

***ADSORPTION STUDY OF REMAZOL BRILLIANT VIOLET 5R ON
COTTON FABRIC MODIFIED WITH 3-CHLORO-2-HYDROXYPROPYL
TRIMETHYLAMMONIUM CHLORIDE***

Luthfita Keysha Aulia Giharto
21/482092/PA/21020

ABSTRACT

Adsorption of Remazol Brilliant Violet 5R (RBV-5R) as the adsorbate on *3-Chloro-2-Hydroxypropyl Trimethylammonium Chloride* (CHPTAC) modified cotton fabric as the adsorbent has been conducted. This research aimed to characterize CHPTAC modified cotton fabric as an adsorbent to determine the optimum pH conditions, adsorbent mass, contact time, and adsorbate concentration. CHPTAC was first converted into EPTAC by adding NaOH before interacting with the cotton fabric fibers. The modified CHPTAC cotton fabric was then characterized using FTIR and SEM-EDX. Adsorption of RBV-5R on CHPTAC modified cotton fabric was carried out by varying the pH of the solution, adsorbent mass, contact time, and adsorbate concentration. Variation of contact time was used to determine the adsorption kinetics, while variation of RBV-5R initial concentration was used to determine the adsorption isotherms. Furthermore, a desorption study was conducted to investigate the release of RBV-5R dye from the CHPTAC modified cotton fabric adsorbent, examining the effect of desorption solution and time.

The results showed that the modification of cotton fabric with CHPTAC had been successfully carried out. The interaction of RBV-5R with CHPTAC modified cotton fabric adsorbent was optimum at pH 4, 50 mg of adsorbent mass, 30 minutes contact time, and 300 mg L⁻¹ adsorbate concentration. The adsorption RBV-5R with CHPTAC modified cotton fabric adsorbent followed a pseudo-second-order kinetic model with an adsorption rate constant value of 8,41×10⁻² g mg⁻¹ min⁻¹ and Langmuir isotherm model with an maximum adsorption capacity of 86,95 mg g⁻¹. The optimal solution for the desorption of RBV-5R on CHPTAC modified cotton fabric is NaSCN solution, with a desorption percentage of 92% and an optimum contact time of 120 minutes.

Keywords: adsorption, cotton fabric, desorption, Remazol Brilliant Violet 5R