

PEMANFAATAN *BEADS* KITOSAN KATIONIK TERMODIFIKASI EPTAC SEBAGAI ADSORBEN UNTUK PENGHILANGAN ZAT WARNA ANIONIK *REMAZOL BRILLIANT BLUE R* (RBBR) DALAM LARUTAN

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INTISARI

Penelitian mengenai adsorpsi zat warna *Remazol Brilliant Blue R* (RBBR) menggunakan adsorben *beads* kitosan yang dimodifikasi dengan senyawa EPTAC telah dilakukan. Tujuan dari penelitian ini meliputi pembuatan adsorben termodifikasi, karakterisasi material, serta penentuan kondisi optimum adsorpsi berdasarkan variasi pH, massa adsorben, waktu kontak, dan konsentrasi adsorbat, serta analisis kinetika dan isoterm adsorpsi. Proses modifikasi dilakukan dengan mereaksikan kitosan dengan CHPTAC dalam suasana basa menggunakan larutan natrium hidroksida (NaOH) yang diaduk selama 24 jam. Produk hasil modifikasi kemudian dilakukan proses *crosslinking* (ikat silang) menggunakan glutaraldehid dan dibentuk menjadi *beads* kitosan. Selanjutnya, adsorben yang diperoleh dikarakterisasi menggunakan ATR-FTIR dan SEM-EDX, serta diuji kinerjanya melalui uji aktivitas adsorpsi terhadap zat warna RBBR.

Hasil penelitian menunjukkan bahwa proses modifikasi kitosan dengan EPTAC berhasil dilakukan, yang dibuktikan melalui hasil karakterisasi dan uji aktivitas adsorben. Kondisi optimum adsorpsi RBBR tercapai pada pH 4, massa adsorben 50 mg, waktu kontak 90 menit, dan konsentrasi awal adsorbat 400 mg L⁻¹. Pada kondisi tersebut, diperoleh kapasitas adsorpsi sebesar 64,29 mg g⁻¹ (0,1026 mmol g⁻¹). Selain itu, proses adsorpsi mengikuti model kinetika orde dua semu dengan nilai konstanta laju sebesar 1,23 x 10⁻³ g mg⁻¹ menit⁻¹, serta sesuai dengan model isoterm Langmuir dengan nilai konstanta Langmuir 159,3 L mg⁻¹ atau setara 9,98 x 10⁷ L mol⁻¹.

Kata kunci: adsorpsi, *beads* kitosan, EPTAC, RBBR

***UTILIZATION OF EPTAC-MODIFIED CATIONIC CHITOSAN BEADS AS
AN ADSORBENT FOR THE REMOVAL OF ANIONIC DYE REMAZOL
BRILLIANT BLUE R (RBBR) FROM AQUEOUS SOLUTION***

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ABSTRACT

This study investigates the adsorption of Remazol Brilliant Blue R (RBBR) dye using chitosan beads modified with EPTAC. The objectives of this research were to synthesize and characterize the modified adsorbent, determine the optimum adsorption conditions (pH, adsorbent mass, contact time, and initial dye concentration), and evaluate the adsorption kinetics and isotherm models. The modification was carried out by reacting chitosan with CHPTAC in an alkaline medium using sodium hydroxide (NaOH), followed by stirring for 24 hours. The modified product was then crosslinked with glutaraldehyde and formed into chitosan beads. The obtained adsorbent was characterized using ATR-FTIR and SEM-EDX, and its adsorption performance was evaluated through adsorption activity tests.

The results indicated that the modification of chitosan with EPTAC was successfully achieved, as confirmed by characterization and adsorption activity results. The optimum adsorption conditions were found at pH 4, adsorbent mass of 50 mg, contact time of 90 minutes, and an initial adsorbate concentration of 400 mg L⁻¹. Under these conditions, the adsorption capacity (q_e) was 64.29 mg g⁻¹ (0.1026 mmol g⁻¹). The adsorption process followed the pseudo-second-order kinetic model with a rate constant of 1.23 x 10⁻³ g mg⁻¹ min⁻¹ and was best described by the Langmuir isotherm model with a Langmuir constant of 159.3 L mg⁻¹ or equivalent to 9.98 x 10⁷ L mol⁻¹.

Keywords: adsorption, chitosan beads, EPTAC, RBBR