

PEMANFAATAN DAUN NANAS SEBAGAI ADSORBEN SELULOSA TERMODIFIKASI POLIETILENIMINA TERTAUT SILANG GLUTARALDEHID UNTUK ADSORPSI *SUNSET YELLOW*

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INTISARI

Adsorpsi zat warna *sunset yellow* (SY) menggunakan adsorben selulosa-glutaraldehyd-polietilenimina (Sel-Gal-Pei) telah dilakukan. Tujuan dari penelitian ini adalah melakukan sintesis adsorben Sel-Gal-Pei serta untuk penentuan pH optimum, isoterm adsorpsi, dan kinetika adsorpsi SY menggunakan adsorben Sel-Gal-Pei. Isolasi selulosa dari daun nanas dilakukan melalui proses hidrolisis, *bleaching*, dan pencucian. Sintesis adsorben dilakukan dengan cara menautsilangkan selulosa dengan polietilenimina (PEI) menggunakan glutaraldehyd. Adsorben Sel-Gal-Pei diuji stabilitasnya pada variasi pH 2-8. Studi adsorpsi SY dipelajari dengan penentuan pH optimum, isoterm adsorpsi, dan kinetika adsorpsi. Studi desorpsi dilakukan dalam pelarut akuades, etanol 0,1 M, HCl 0,1 M, NaCl 0,1 M, dan NaOH 0,1 M. Karakterisasi dilakukan dengan menggunakan FT-IR, SEM-EDX, dan XRD.

Hasil penelitian menunjukkan bahwa adsorben Sel-Gal-Pei bersifat stabil dalam variasi pH 2-8. Kapasitas adsorpsi SY optimum diperoleh pada pH 2. Adsorpsi SY menggunakan adsorben Sel-Gal-Pei mengikuti model isoterm adsorpsi Langmuir dengan nilai q_{\max} 57,84 mg g⁻¹ dan nilai K_L sebesar 0,2650 L mg⁻¹. Pada model kinetika adsorpsi mengikuti model kinetika orde dua semu Ho and Mc Kay dengan nilai konstanta laju adsorpsi 6×10^{-4} g mg⁻¹ menit⁻¹. Larutan NaOH 0,1 M memiliki kemampuan untuk desorpsi SY paling optimal dengan persen desorpsi sebesar 24,84%. Hasil ini menunjukkan bahwa Sel-Gal-Pei merupakan adsorben alternatif dan ramah lingkungan yang dapat digunakan untuk adsorpsi zat warna SY

Kata kunci: adsorben Sel-Gal-Pei, adsorpsi, isoterm, kinetika, *sunset yellow*.

UTILIZATION OF PINEAPPLE LEAVES AS A GLUTARALDEHYDE- CROSSLINKED POLYETHYLENIMINE-MODIFIED CELLULOSE ADSORBENT FOR SUNSET YELLOW ADSORPTION

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ABSTRACT

Adsorption of sunset yellow (SY) dye using cellulose-glutaraldehyde-polyethylenimine (Sel-Gal-Pei) adsorbent was carried out. This research aims to synthesize the Sel-Gal-Pei adsorbent and to determine the optimum pH, adsorption isotherms, and SY adsorption kinetics using the Sel-Gal-Pei adsorbent. Cellulose was isolated from pineapple leaves through hydrolysis, bleaching, and washing. The adsorbent synthesis was performed by cross-linking cellulose with polyethylenimine (PEI) using glutaraldehyde. The stability of the Cel-Glu-PEI adsorbent was tested across a pH range of 2-8. SY adsorption studies were studied by determining the optimum pH, adsorption isotherm, and adsorption kinetics. The desorption studies were carried out in distilled water, 0.1 M ethanol, 0.1 M HCl, 0.1 M NaCl, and 0.1 M NaOH. Characterization was carried out using FT-IR, SEM-EDX, and XRD.

The results showed that the Sel-Gal-Pei adsorbent was stable in pH range of 2-8. The optimum SY adsorption capacity was obtained at pH 2. SY adsorption using the Sel-Gal-Pei adsorbent followed the Langmuir adsorption isotherm model with a q_{\max} value 57.84 mg g⁻¹ and a K_L value of 0.2650 L mg⁻¹. Meanwhile, the adsorption kinetic model follows the Ho and Mc Kay pseudo-second-order kinetic model with an adsorption rate constant of 6×10^{-4} g mg⁻¹ minute⁻¹. A 0.1 M NaOH solution showed the most optimal desorption capacity for SY with a desorption percentage of 24.84%. These results indicate that Sel-Gal-Pei is an alternative and environmentally friendly adsorbent that can be used for the adsorption of SY dye.

Keywords: adsorption, isotherm, kinetics, Sel-Gal-Pei adsorbent, sunset yellow.