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## CHITOSAN-BASED ADSORBENTS GELS FOR THE REMOVAL OF TRIS-AZO DYE: ISOTHERMS AND KINETICS STUDIES

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### Abstract

The adsorbent gels utilized in this research project were synthesized from non-commercially available chitosan, obtained by deacetylation of chitin, which was isolated from fermented shrimp waste by a major local industrial food biopolymer. Chitosan-based adsorbent gels were used for the removal of a tris-azo dye (Direct Blue 71) from aqueous solutions. Sorption experiments focused on the chemical modification of chitosan using two cross-linking agents, sodium tripolyphosphate (TPP) and glutaraldehyde (Glu). The effect of pH, biosorbent concentration, and contact time were studied in a batch system.

To investigate the mechanisms of adsorption, experimental data for different initial dye concentrations were modeled using the equations of Lagergren, Ho and McKay and Webber and Morris. A comparison was made between the linear and non-linear methods of the Langmuir and Freundlich isotherm. The results of the adsorption experiments showed that the Langmuir model fitted the experimental data from this research study, where the maximum adsorption capacity of the adsorbent for dye was 88.49 mg/g (linear form) and 92.22 mg/g (non linear form). The kinetic data of the adsorption could be well represented by the pseudo-second-order model with the correlation coefficients ( $R^2 > 0.9934$ ). These suggest that the sorption results could be employed by column studies and demonstrate the applicability of the gels for the removal of dyes under dynamic conditions.

*Key words:* cross-linked chitosan, Direct Blue 71, glutaraldehyde, Langmuir isotherm, pseudo-second-order model

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