Biosorption of phenol from aqueous solutions by the *Aspergillus niger* biomass: comparison of linear and non-linear regression analysis

Ilknur Senturk\textsuperscript{a,*,1}, Hanife Buyukgungor\textsuperscript{a}, Feza Geyikci\textsuperscript{b}

\textsuperscript{a}Engineering Faculty, Environmental Engineering Department, Ondokuz Mayis University, TR55139 Samsun, Turkey, Tel. +90 0346 219 10 10; emails: ilknur.senturk@gmail.com (I. Senturk), hbuyukg@omu.edu.tr (H. Buyukgungor)

\textsuperscript{b}Engineering Faculty, Chemical Engineering Department, Ondokuz Mayis University, TR55139, Samsun, Turkey, email: fezag@omu.edu.tr

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\begin{abstract}
In this study, the removal characteristics of phenol from aqueous solution by the live *Aspergillus niger* were investigated under various operating variables like contact time, initial phenol concentration, biomass dosage, and temperature. The biosorption of phenol reached equilibrium in 48 h. The maximum loading capacity of the sorbent was also found to be 30.0 mg/g for live *A. niger* at an initial phenol concentration of 550 mg/L. Kinetic evaluation of experimental data showed that the biosorption of phenol on *A. niger* conformed closely to the intra particle diffusion model. Langmuir and Freundlich models were applied to describe the biosorption isotherms. Akaike’s information criterion (AIC) values were calculated for Langmuir (6.54) and Freundlich (12.45) isotherms, respectively. Having a smaller AIC value suggests that Langmuir isotherm is more likely to be a better fit. Thermodynamic parameters such as standard Gibbs free energy (ΔG°), standard enthalpy (ΔH°), and standard entropy (ΔS°) were obtained by applying the Van’t Hoff equation. The thermodynamics parameters indicated that the biosorption was spontaneous and endothermic. This research showed that fungal biosorption has a potential to be used in the removal of phenol from wastewaters.

\textbf{Keywords:} *Aspergillus niger*, Biosorption, Equilibrium isotherm, Kinetics, Phenol
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