



*“Gheorghe Asachi” Technical University of Iasi, Romania*



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## USING WASTE FOUNDRY SAND FOR THE REMOVAL OF MALACHITE GREEN DYE FROM AQUEOUS SOLUTIONS - KINETIC AND EQUILIBRIUM STUDIES

**Elif Hatice Gürkan, Semra Çoruh\***

*Department of Environmental Engineering, Ondokuz Mayıs University, 55139 Samsun, Turkey*

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### **Abstract**

The aim of this study was to examine the adsorption of malachite green dye from aqueous solutions on the waste foundry sand. The effects of contact time, adsorbent amount, pH and initial dye concentration were investigated. The equilibrium adsorption data were analyzed by Langmuir, Freundlich and Temkin adsorption isotherm models. The adsorption capacity of waste foundry sand for the removal of malachite green dye was determined with the Langmuir and found to be 23.29 mg/g. The adsorption isotherm constants were employed to calculate thermodynamic parameters like Gibbs free energy, changes in enthalpy and entropy. The adsorption kinetic data were modeled using the pseudo-second order, intraparticle diffusion and Elovich isotherm model. Adsorption data of the malachite green dye was fitted well by the pseudo-second-order model. In the present study, several error analysis methods were used in order to confirm the best fitting kinetic system, namely the coefficient of determination ( $R^2$ ) and the sum of error squared (SSE). We used a statistical approach for comparing models, namely Akaike's information criterion (AIC), which has had a fundamental impact in statistical model evaluation problems.

*Keywords:* adsorption, isotherm, malachite green, waste foundry sand

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\* Author to whom all correspondence should be addressed: e-mail: semcoruh@omu.edu.tr; Phone: +90 362 312 1919; Fax: +90 3624576094