

Title: Investigation of Cadmium (II) Ions Biosorption onto Pretreated Dried Activated Sludge

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Abstract: Problem statement: Heavy metals have been one of hazardous components in industrial effluents that can be damaged on the environment by discharging uncontrolled wastewater. The aims of this investigation were biosorption of Cd (II) ions onto pretreated dried activated sludge and determination of kinetic and isotherm of biosorption. Approach: Activated sludge was obtained from Tehran municipal wastewater treatment plant. Activated Sludge was dried and used for biosorbption of Cd (II) ions from aqueous solution. Dried Activated Sluge (DAS) was pretreated with three different solutions (H₂O₂, NaOH and ethanol). Biosorption capacity of different types of DAS to remove Cd (II) ions was investigated as a function of Cd (II) concentrations at variable initial Cd (II) concentrations between 10 and 500 mg L⁻¹ with a DAS particle size 0.2-0.3 mm using batch biosorption experiments. Results: Biosorption of Cd (II) by Dried Activated Sludge (DAS) was found to perform better than the others after pretreatment with H₂O₂. The maximum biosorption capacity was given 256.41, 217.39, 212.77 and 204.08 mg g⁻¹ for the H₂O₂, NaOH; Ethanol pretreated and untreated DAS, respectively. The pseudo-second order kinetic model was found to be more suitable than the pseudo-first order kinetic model to correlate the experimental data for all types of DAS (R²>0.9). The Freundlich isotherm was found to fit the experimental data slightly better than the Langmuir isotherm model for all pretreated and untreated DAS (R²>0.99). Conclusion: It can be concluded that pretreatment DAS yield higher Cd (II) biosorption capacity, especially DAS that pretreated with H₂O₂.