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Adsorption of Quaternary Ammonium Compounds onto Activated Sludge

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ABSTRACT

The performance of activated sludge in the removal of tetradecyl benzyl dimethyl ammonium chloride (C14BDMA) by adsorption from aqueous solution was investigated with different PH, contact time, ionic strength and temperature. Equilibrium was achieved within 2 h of contact time. The adsorption capacity increased largely with increasing solution pH and remained constant above pH 9. The ionic strength had a negative effect on C14BDMA removal. The adsorption isotherms were analyzed by Langmuir and Freundlich isotherm models, and equilibrium partitioning data was described well by both models. Kinetics data was best described by the pseudo second-order model. Experimental results indicated that the adsorption was favorable at lower temperatures. Thermodynamic parameters, including the Gibbs free energy (ΔG_0), enthalpy (ΔH_0), and entropy (ΔS_0), were also calculated. These parameters indicated that adsorption of C14BDMA onto activated sludge was feasible, spontaneous and exothermic in the temperature range of 15-35°C. The activated sludge was shown to be an effective adsorbent for C14BDMA.

KEYWORDS

Activated Sludge, Adsorption, Kinetics, Quaternary Ammonium Compounds, Thermodynamics Analysis

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