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Removal of chromium by adsorption on activated alumina

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ABSTRACT

The removal of chromium (VI) from aqueous solutions by activated alumina has been investigated as a function of solution pH, initial chromium concentration, adsorbent dose of activated alumina and temperature. The pH and the adsorbent dose of activated alumina are the most significant parameters affecting chromium (VI) adsorption. The chromium concentrations were analyzed by reaction with 1,5-diphenylcarbazide. This method has been validated according to the French standard XPT-90-210. In order to optimize the effect of the main parameters and their mutual interaction for the adsorption process, a full factor design of the type n^k has been used. Thus, the total number of trial experiments needed for an investigation is 2^4. The Freundlich and Langmuir models have been applied and the equilibrium adsorption data were found to best fit the Freundlich and Langmuir adsorption isotherm. A comparison of kinetic models applied to the adsorption of chromium (VI) on activated alumina was evaluated for the first-order and the second-order models respectively. Results show that the second-order kinetic model was found to correlate the experimental data well.

Keywords: Cr(VI); Adsorption; Activated alumina; Freundlich; Langmuir

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