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Comparison of the cadmium removal efficiency by two calcium phosphate powders

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Abstract

Cadmium is a chemical element that finds application in many fields. As a consequence of the numerous human activities related to its wide spread applications, the environment gets contaminated. One of the most severe consequences happens in aquatic habitats. Cadmium removal from aqueous solution by many different materials has been studied. However, the limited ability of the existing models to fit the experimental data, determination of important parameters such as mass of extracted heavy metal per unit mass of decontaminant, or predict how fast the process will occur, such as adsorption kinetics constants, is still a concern. In this work, two models are used to fit the adsorption data gathered at different temperatures by two distinct decontaminant calcium phosphate (CaP) powders, hydroxyapatite (HAp) and tricalcium phosphate (β-TCP). The fitting models are nonlinear forms of pseudo first-order adsorption kinetics and the pseudo second-order adsorption kinetics. Determination of important parameters of both models was performed for both HAp and β-TCP under each of the experimental conditions used. The results disclose very interesting adsorption properties of cadmium ions from aqueous media by β-TCP.

Keywords: Cadmium removal; tricalcium phosphate (β-TCP); hydroxyapatite (HAp); water decontamination; adsorption kinetics; non-linear fitting.

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