

An eco-friendly and low-cost strategy for groundwater defluorination: Adsorption of fluoride onto calcinated sludge

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Abstract

The excess of fluoride ions (F^-) in water for human supply is a serious public health. The recommended concentration of F^- ions by the World Health Organization (WHO) is 1.5 mg L^{-1} . Several groundwater sources around the world contain high F^- concentrations, and require treatment before human consumption. It was developed an eco-friendly and low-cost strategy for groundwater defluorination, i.e., adsorption onto calcinated sludge. This strategy was efficient at pH of 5.5 and using 5 g L^{-1} of calcinated sludge. The groundwater attained the WHO standard within 60 min. The kinetic model of pseudo-second-order obtained a better adjustment to the experimental data. The equilibrium curve at $25 \text{ }^\circ\text{C}$ was better represented by the Tóth model. The maximum adsorption capacity was 2.04 mg g^{-1} . Therefore, adsorption using calcinated sludge can be considered as an eco-friendly and low-cost strategy for groundwater defluorination.

Keywords

Adsorption; Defluorination; Water treatment; World Health Organization