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Removal of chlorite from aqueous solution by MIEX resin

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ABSTRACT

This research investigates the feasibility of magnetic ion exchange (MIEX) resin as the adsorbent for the removal of chlorite through a laboratory study using batch adsorption experiments. The agitation speed of 100 rpm is the optimum agitation intensity. The removal efficiency of chlorite increases with increasing dosage of MIEX resin. The optimum pH is 5–7. The coexisting anions and natural organic matter reduce the removal efficiency of chlorite. The kinetic process at the low chlorite concentration (1.02 mg/L) is highly possible to be pseudo-first-order. However, the pseudo-second-order model can fit the kinetic data quite well at higher chlorite concentrations (2.28–5.57 mg/L). At the initial stage of adsorption, the intra-particle diffusion is the rate-limiting step, but the adsorption rate is controlled by the film diffusion and the intra-particle diffusion after 10 min. The adsorption equilibrium can be approximately attained within 40 min, and Redlich–Peterson isotherm model fits best to the equilibrium data. The adsorption is a thermodynamically feasible, spontaneous, and endothermic ion-exchange process. The removal of chloride on MIEX resin is an ion-exchange mechanism. Dissolved organic carbon can be removed effectively as well as chlorite and chlorate using MIEX resin in real water. Therefore, MIEX resin is a promising technology for the removal of chlorite from aqueous solution.

Keywords: Adsorption; Chlorite; Ion exchange; Kinetics; MIEX resin

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