Removal of Fluoride from Water using Zeolite

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The excess fluoride concentration in groundwater has become a major issue among many countries in the world. Also, in Sri Lanka several districts are affected with excess fluoride in groundwater. The main aim of this study was to introduce a cost effective and environmentally friendly fluoride removal method by using zeolite. A batch adsorption study was conducted at pH 7 and at room temperature by using test solutions containing 10 mg L^{-1} of initial fluoride concentration. The removal efficiency of adsorbent was studied by using different parameters like dose, contact time, stirring rate and initial fluoride concentration. The dose of adsorbent having the optimum fluoride removal efficiency was found to be 2.5 g. The optimum contact time, optimum stirring rate and the optimum initial fluoride concentration were found to be as 16 hours, 120 rpm and 8 mg L^{-1}, respectively. Both the Langmuir and Freundlich adsorption isotherms fitted well for the fluoride adsorption on zeolite with the regression coefficient R^2 of 0.96 and 0.97, respectively. Zeolite gave around 45% of fluoride removal efficiency and certain modifications to zeolite are needed to increase the efficiency.

Keywords: Zeolite, Adsorption, Removal efficiency, Langmuir, Freundlich