

ARSENIC REMOVAL IN GROUNDWATERS CONTAINING LOW IRON CONCENTRATIONS BY COMMERCIAL MICROFILTERS

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ABSTRACT

Monitoring of the performance of a filtration system for the simultaneous removal of As and Fe was carried out during 40 days, treating groundwater containing low total iron concentrations. The system comprises an aeration tank with a commercial spray and two commercial polypropylene microfilters (5 μm) arranged in series. The simultaneous removal of both ions within the advection path of the groundwater has also been studied. There is a significant removal of iron (up to 42%) and arsenic (up to 75%) in the path between the wellhead to the entrance to the aeration tank.

The groundwater physical and chemical characteristics are suitable for the simultaneous removal of arsenic and iron, due to its moderate concentrations of Ca^{2+} , neutral pH and low nitrate and sulfate concentrations, which may compete with arsenate species for the adsorption sites on the surface of the iron oxide retained by the porous media. Even though the total iron content in the groundwater is relatively low (< 0.3 mg/l), there exists a significant accumulation of iron hydroxide on the surface of the porous media, reaching contents of 53-70% (as Fe_2O_3) of the total mass of retained solids.

Removal efficiencies for total arsenic and total iron were significant (33-41% y 46-78%, respectively), providing that only the natural occurrence of iron in groundwater is used. Consequently, the filtration system can be considered appropriate for a consumption rate of 160 l/d, under the described conditions. The arsenic removal efficiency is lower than that obtained using the pilot plant based on solar collectors, mainly due to the high doses of iron salts added.

Keywords: Simultaneous Removal of Arsenic and Iron, Aeration, Microfiltration.