



Boron removal from the water with chemical precipitation methods

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Received 23 September 2019; Accepted 22 January 2020

ABSTRACT

Boron is a common element in the nature. Its concentration in the water depends mainly on the geochemical character of the catchment area and anthropogenic sources (artificial fertilizers, processing and exploitation of minerals, leaching from fly ash, landfills, geothermal water, and industrial wastewater) which are a major threat of water pollution with boron. Moreover it is an element that so far has been random, taking into account its influence on the human body. The maximum dose of boron that can be absorbed without harming the human body is 1.0 mg B per kg of human body weight. Significantly exceeding these values causes harmful side effects. It was the reason to conduct research on boron removal from water with popular methods of water treatment commonly using at urban water treatment stations. There were applied methods of coagulation and chemical precipitation using aluminum sulfate $[\text{Al}_2(\text{SO}_4)_3]$, calcium hydroxide $\text{Ca}(\text{OH})_2$ (Low Lime Process and High Lime Process), iron (III) chlorosulfate, and polyaluminum chloride (III). The experiments were carried out using laboratory reactors, where coagulants were added in different doses. As part of tests, analyses of contamination in raw and purified water were carried out and included: pH, color, turbidity, alkalinity, chemical oxygen demand-Mn, Ca, Mg, and boron. On the basis of the conducted research, it was found that effective boron removal is possible with the use of lime precipitation at a high pH range. The other tested methods were less effective.

Keywords: Boron; Coagulation; Precipitation; Water treatment
