Use of activated silica sol as a coagulant aid to remove aluminium from water defluoridated by electrocoagulation

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ABSTRACT

Presence of fluorides in drinking water has become a public health problem. Aluminium compounds are popular for defluoridation of water owing to high affinity of fluoride toward aluminium. Use of these compounds may lead to high aluminium concentrations in drinking water. Aluminium is found to be a potential neurotoxicant. Synergistic associations of both aluminium and fluorides in the drinking water supply have been expounded by researchers. Aluminium–fluoride complexes also increase the risk of developing Alzheimer’s disease. Therefore, it is imperative to control the residual aluminium in the water. In the present work, the electrocoagulation process with aluminium electrodes has been used for defluoridation of water. In subsequent steps, activated silica sol has been used as a coagulant aid to remove aluminium from defluoridated water. Taguchi design has been used to develop a statistical model for aluminium removal. The experimental investigations revealed that activated silica sol reduces residual aluminium to a range of 0.003–0.034 mg/L.

Keywords: Activated silica sol; Aluminium; Coagulant aid; Electrocoagulation; Fluoride