

Reduction of Excess Hardness and Fluoride in Groundwater by Electro Coagulation

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ABSTRACT

The Sri Lankan standard (SLS 614: 1983) for desirable levels of hardness and fluoride in drinking water is given as 250 mg/L CaCO₃ and 0.6 mg/L F⁻, respectively, but the drinking water wells in most of the dry zone areas of Sri Lanka exceed these levels by 4 – 5 times. The hardness makes the life inconvenient to the public in the form of scaling in the plumbing material, insolubility of soap in laundering, while fluoride causes health effects known as dental and skeletal fluorosis. These could be mitigated through a process called Electro Coagulation. The basic features of Electro Coagulation are dissolution of metal ions from an electrode by an applied potential, simultaneous evolution of hydrogen gas bubbles, destabilization of suspension, coagulation and sedimentation.

The aim of this study is to reduce hardness and fluoride in drinking water by Electro Coagulation using locally available raw materials. It is a very simple process, and a pilot project is in operation in a community based water supply scheme which serves 105 households in Asokamalagama, Vilachchiya. Its processing capacity is 100 liters/hour. The hardness level of raw water is 180 mg/l CaCO₃ and the fluoride content is 5.2 mg/l. In the processed water, the average hardness level and the fluoride content are 80 mg/l and 1.2 mg/l, respectively. Thus, the hardness is reduced by 50-60% and the fluoride by 80-90%, attesting to the effectiveness of Electro Coagulation. The processed water quality is in conformity with the SLS 614: 1983 drinking water standards. The pilot project which started in August 2010 is continuing and the plant is operated by two females, thus, empowering village women. The processed water is distributed in the community at the rate of Rs. 2.00 per liter of water, thus, the concept of SAFE WATER SHOP is established in Asokamalagama, Vilachchiya.
