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Fluoride removal studies of water using natural materials found in Sri Lanka

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Fluoride is considered as a double edged weapon as in correct dosage it strengthens the enamel to prevent dental caries and in excess causes ugly brown stains of the teeth called dental fluorosis. High fluoride levels in the ground water are a major problem that leads to diseases related to high fluoride intake amongst people. This problem now has risen to endemic levels in Sri Lanka, especially in the North Central Province and some other dry zone areas.

In this research removal of fluoride from water was attempted using natural materials such as red soil, brick, mica, serpentine and charcoal. Initially the defluoridation capacities of these materials were analyzed by setting up a vertical column (height 55 cm, diameter 3.5 cm) of each material and then by passing a known volume of 10 mg dm^{-3} fluoride standard solutions within predetermined time intervals. By this analysis brick, red soil and mica were identified as the best fluoride removal materials. Then ground water collected from Eppawala and Polpithigama areas were analyzed using the three materials after the defluoridation process. First, each sample of natural water was passed through individual columns packed with each material. This study reveals that red soil and brick have the best fluoride removal capacity, followed by mica, serpentine and charcoal. The same procedure was repeated for another separate set of water samples, but using mixed beds packed proportionately according to the defluoridation capacities of materials. In each experiment the effluent of the ground water was analyzed for fluoride as well as nitrite, nitrate, iron and hardness (non fluoride parameters).However, no significance difference was observed for non fluoride parameters.

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