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A new household defluoridator with Zeolite as a defluoridating agent

Fluoride content in ground water in several parts of the dry zone is known to be high compared to the recommended WHO limit of 1 ppm. Excessive fluorides in drinking water can lead to dental fluorosis and skeletal fluorosis. Various fluoride adsorption materials such as alumina, many types of soils, activated carbon, charcoal, bone char ect. have been identified. In this paper, a synthesized Zeolite as an efficient fluoride adsorption material is presented.

Zeolite was synthesized in the laboratory using Aluminium sulphate, Aluminium Oxide, Sodium Hydroxide and Sodium Silicate. **Aluminium present in the lattice of the Zeolite was expected to increase the absorption of fluoride from the water. Absorbed fluoride ions are trapped in the cavities of the Zeolite**.

The synthesized Zeolite was tested for total fluoride adsorption capacity and breakthrough capacity for fluoride. Standard fluoride solutions ranging from 2 to 10 ppm were eluted through. Zeolite and the results were compared with those of bricks and bone char. The total fluoride adsorption capacities of Zeolites, bricks and bone char were found to be 9.21, , 7.62 and 1.45 mg? g respectively. It is estimated that the breakthrough capacity of the Zeolite is about 1, 650 mL for 5 ppm fluoride solution for a column volume of 40 mL.

The synthesized Zeolite was tested using a clay filter unit commonly available in the market as a drinking water filter. The filter consists of an inner clay chamber with a porous clay candle, and an outer clay chamber with a tap. The candle was filled with 1000 mL of prepared Zeolite. Fluoride solutions of varying concentrations of 2-6 ppm of fluoride were tested on the filter set up. It was found that the filter set up defluridates 500 L of water containing 4.00 ppm fluoride.

Zeolite was tested for e-generation with water, 0.01 M NaOH and 0.01 M NaXl. The results showed that 0.01 M NaCl solution was the best. 0.01 M NaOH damaged the column due to the dissolution of Zeolite and water did not regenerate the Zeolite.

This study shows that the synthesized Zeolite is a much better defluoridating agent than the commonly used bricks and bone char. This simple defluoridator set-up containing Zeolite can be used as a household defluoridator set-up containing Zeolite can be used as a household defluoridator with a minimum cost.