UNIVERSITY OF NAIROBI

DEFLUORIDATION OF DRINKING WATER IN KITENGELA USING CLAY

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Abstract

The fluoride which enters the hydrological system may, to a large extent, be traced back to volcanic activities associated with rift formation and chemical weathering of volcanic rocks. The African Rift System is dominated by alkaline base-rocks, and high-fluoride groundwater is a rule in the rift valley and the surrounding areas. One of the areas exposed to high fluoride in water is Kitengela and as a result dental and skeletal fluorosis are endemic in the town. There is an acute need for a simple and inexpensive methods for defluoridation of water in the town.

The project evaluated the defluoridation of drinking water from Kitengela using clay soil. Seven borehole water samples were obtained from Kitengela town for the defluoridation test. Fluoride sorbent clays from Syokimau, Chepsion and Mwea were studied and used for batch defluoridation. The effect of pH, contact time, particle size and fluoride concentration were examined. It was found that fluoride concentration increased with borehole depths. Sun drying the clays reduced erosion during deflouridation and eased flow of water in the defluoridation column. It was established that the pH of the soil was indicative of its fluoride removal capacity. An increased pH value translated to an increase in the fluoride removal capacity.

Fluoride adsorption comparisons were made and the study revealed that Syokimau clay has a superior capacity than others. Its average fluoride removal efficiency was 61% compared to 59% for Mwea clay and 40% for Chepsion clay. Syokimau clay emerged the suitable defluoridation medium.

Dedication

To almighty God for the life and strength he has granted me.

To the residents of Kitengela and areas in Kenya whose water is affected by high fluoride concentration.

To my family and friends for their treasured encouragement and support.

Acknowledgement

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