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Abstract

In Northern Tanzania, high levels of fluoride in community drinking water supply is recognized as one of the major public health concern, the problem is further ameliorated by presence Escherichia coli and fecal coliform bacteria in surface water and shallow wells. Efforts to decontaminate the water involve mostly the use of low efficient bone char for fluoride removal without disinfecting the pathogens. To address this problem, a robust adsorbent which is capable of removing fluoride and microbes simultaneously with minimal diverse impact on the treated water is necessary. Here we highlight development of composite material developed from recycling of crustacean biomass waste from sea food industry. Chitosan polymer, isolated from prawns shell was composited with crab shell derived brushite (CaHPO4.2H2O) to form chitosan-hydroxyapatite composite. XRD and FT-IR analysis confirmed transformation of brushite phases into hydroxyapatite and formation hybrid composite. Fluoride adsorption tests were performed in batch mode to evaluate effectiveness. Defluoridation capacity of up to 6.4 mg/g in field water containing fluoride concentration of 5-70 mg/L was achieved. The best performance was observed with fluoride concentration of 10 mg/L and below. Apart from fluoride removal, the composite also reduced color tint and microbes from surface water samples. The pH of the treated water in most samples remained around 6.5-8.5, which is acceptable for drinking water.