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REMOVAL OF FLUORIDE FROM WATER USING INDUSTRIAL BY-PRODUCTS AS ADSORBENTS

Bindhu Beenacottage Kumarakurup^{1*}, Haritha Muraleedharan

Department of Civil Engineering, Rajiv Gandhi Institute of Technology, Kottayam-686501, Kerala, India

Abstract

The effectiveness of fluoride removal employing three locally available materials from Kerala - M sand slurry, rubber wood sawdust, and coconut shell charcoal - was investigated through both batch and column tests. Key controlling factors such as contact time (ranging from 0 to 180 minutes), pH (ranging from 2 to 10), and the dosage of adsorbent (ranging from 0.2 to 1.4 g/L) were examined to understand their impact on fluoride removal efficiency. Among these materials, M-sand slurry demonstrated the highest efficiency in the batch study. However, the column study indicated that practical implementation of M-sand slurry might be challenging due to its significant water flow resistance. On the other hand, rubber wood sawdust and coconut shell charcoal exhibited promising potential for defluoridation purposes. To further evaluate the adsorption characteristics, Langmuir and Freundlich isotherms were constructed, and the isotherm constants were employed to assess the nature and performance of the adsorption process in batch studies. Notably, the column study highlighted that rubber wood sawdust outperformed coconut shell charcoal, achieving an impressive fluoride removal efficiency of 92% compared to 87.8%. This enhanced performance was observed at a flow rate of 10 mL/min.

Key words: adsorption, batch study, coconut shell charcoal, column study, isotherms, M sand slurry, rubber wood saw dust

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^{1*} Author to whom all correspondence should be addressed: e-mail: bindhu@rit.ac.in