REMOVAL OF FLUORIDE FROM DRINKING WATER USING LOW COST ADSORBENTS

A

Thesis

Submitted in partial fulfilment

FOR THE DEGREE OF

M-TECH IN ENVIRONMENTAL ENGINEERING

Under The Academic Autonomy

Of

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By

Suman Mann
(2K11/ENE/07)

Under the esteemed Guidance of
Dr. ANUBHA MANDAL
Professor

DEPARTMENT OF ENVIRONMENTAL ENGINEERING
DELHI TECHNOLOGICAL UNIVERSITY
DELHI – 110042
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DELHI TECHNOLOGICAL UNIVERSITY
DELHI

Certificate

This is to certify that the project entitled, "**REMOVAL OF FLUORIDE FROM DRINKING WATER USING LOW COST ADSORBENTS**" submitted by Mrs. Suman Mann in partial requirements for the award of Master of Technology Degree at the Delhi Technological University, Delhi is carried out by her under my supervision and guidance.

Date:

Dr.Anubha Mandal
Department of Environmental Engg.
Delhi Technological University,
Delhi- 110042

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Date: Suman Mann

DECLARATION

I hereby declare that the work embodied in this report is an original investigation carried out by me, on the topic entitled, **"REMOVAL OF FLUORIDE FROM DRINKING WATER USING LOW COST ADSORBENTS",** for partial fulfilment of degree in Master of Technology (Environmental Engineering), Delhi Technological University, Delhi. To the best of my knowledge and belief, this work has not been submitted to any other University or Institution to confer any Degree or Diploma and all the resource of material used for the thesis have been duly acknowledged.

Name: Suman Mann

Signature:

CONTENTS

LIST OF FIGURES

LIST OF TABLES

Abstract

Fluoride is a poison that accumulates in our bones. It has been associated with cancer in young males; osteoporosis; reduced I.Q; and hip fractures in the elderly, to name a few. Fluoride in nature exists as mineral deposits and, naturally, contaminates our ground water resources. Besides, surface water is also being polluted by fluoride due to various anthropogenic activities. The permissible limit of fluoride concentration in drinking water is 1.5mg/L according to WHO guidelines. Therefore, knowledge of its removal, using best technique with maximum efficiency is needed. Among various techniques adsorption occupies a prominent place in fluoride removal. As cost is an important consideration in most developing countries, efforts have been made to explore the possibility of using various low cost adsorbents that are abundant, readily available and are derived from waste materials.

In this study, the adsorption behaviour of sawdust and Banana peel powder has been studied in order to consider its application for fluoride removal. The batch adsorption method was employed: Laboratory investigation of the potential of sawdust and Banana peel powder to remove fluoride from aqueous solution has been studied. The effects of various experimental parameters, such as pH , adsorbent dosage, particle size, contact time and initial concentration were investigated . The equilibrium data have been analyzed by the Langmuir, Freundlich and Tempkin isotherm models. The adsorption kinetics also investigated by the pseudo-first-order, pseudo-second-order, intraparticle diffusion and Elovich model.

Key words: Fluoride, Adsorption, Sawdust, Banana peel powder, Batch adsorption