# Removal of fluoride from ground water by sawdust impregnated with ferric

hydroxide and activated alumina

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## Abstract

Groundwater in many parts of Asia and Africa is contaminated with high fluoride concentration. Several naturally occurring materials such as woods, clays and zeolites were used for fluoride adsorption. Impregnation of chemicals in the natural materials enhances the adsorption capacity for fluoride. In the present study, locally available sawdust (Artocarpus hirsutus) impregnated with ferric hydroxide and activated alumina (SFAA) is studied for the removal of fluoride from groundwater to make it potable. Treated water, contains fluoride level less than the limit suggested by WHO and EPA (1.5 mg/L). This paper presents the effects of parameters such as contact time, temperature, pH, dose rate and concentration on fluoride adsorption by SFAA. Fluoride adsorption by SFAA follows Freundlich isotherm, indicating that the adsorbent surface is heterogeneous in nature. Thermodynamic studies gives that the adsorption process is chemisorption. The adsorption capacity of SFAA was unchanged in the pH range of 1 to 9. This adsorbent is easy to prepare, economic and efficient for defluoridation of groundwater as well as industrial effluents.

## Fluorine

Atomic number 9, MW 18.99, occurs 13<sup>th</sup> most abundant (0.3 g/kg) in the earth crust as sedimentary and igneous rocks. India (17 states Rajasthan, Punjab, Andhrapradesh, Tamilnadu etc.,), Canada, Australia, Ghana, Tanzania, China, Uzbekistan, Ethiopia contains fluoride level higher than WHO limit in groundwater.

#### Source

Industrial effluents and indirectly from atmospheric deposition (weathering and erosion of soil and minerals, Volcanic and fumarolic process).

### **Drinking water standard**

WHO, BIS and EPA recommended 1.5 mg/L (ppm) as maximum contamination limit (MCL) for fluoride in drinking water.