

Study of Fluoride Removal by Using Low Cost Charcoals from Drinking Water

D. S. Sonawane

Department of Chemistry, Jijamata Education Society's
Arts, Commerce and Science College, Nandurbar 425 412 MS India

Abstract

Drinking water is the most important and fundamental needs of all mankind's. Contamination and pollution in drinking water can course various health issues to mankind's. The current works is based on the removal of one of the contaminant form drinking water that's called fluoride. The said experiments are developed for the removal of fluoride is tested by using coconut shell charcoal and paddy husk charcoal. The results showed that both of these adsorbents are effective de-fluoridating agents and good for cleaning drinking water for fluoride.

Key words: Fluoride, Coconut shell charcoal, Paddy husk charcoal, Drinking water, Pollutant, Health issues.

Introduction

A very important life supporting components in natures system is water but this essential component facing problem in many especially in terms of drinking water problems. In India, this drinking water problems starters with contamination of various pollutants such as nitrates, iron and fluorides. Fluoride in water is coming from the ground water that's become the natural sources and which is due to weathering and volcanic eruptions and also from industries, fertilizer, brick and electroplating (Nigussie *et al.*, 2007). All over the world India is 23rd nations which facing health problems due to Fluoride contaminated drinking water (Rubel and Woosley 1979 and APHA/AWEF 1995).

Many workers are working in these fields to solve the issues. Bulusu and Pathak (1979 and 1990) report the method for removal of fluoride by the chemical method. According to Choubisa (1997), initial symptoms of water toxicity in human can cause vomiting, abdominal pain, diarrhoea and even convulsion by the consummation of polluted water. Because of its high toxicity of fluoride to humans there is an urgent need to treat and clear fluoride contaminated water (WHO 2008 and Neelo Razbe *et al.*, 2013)

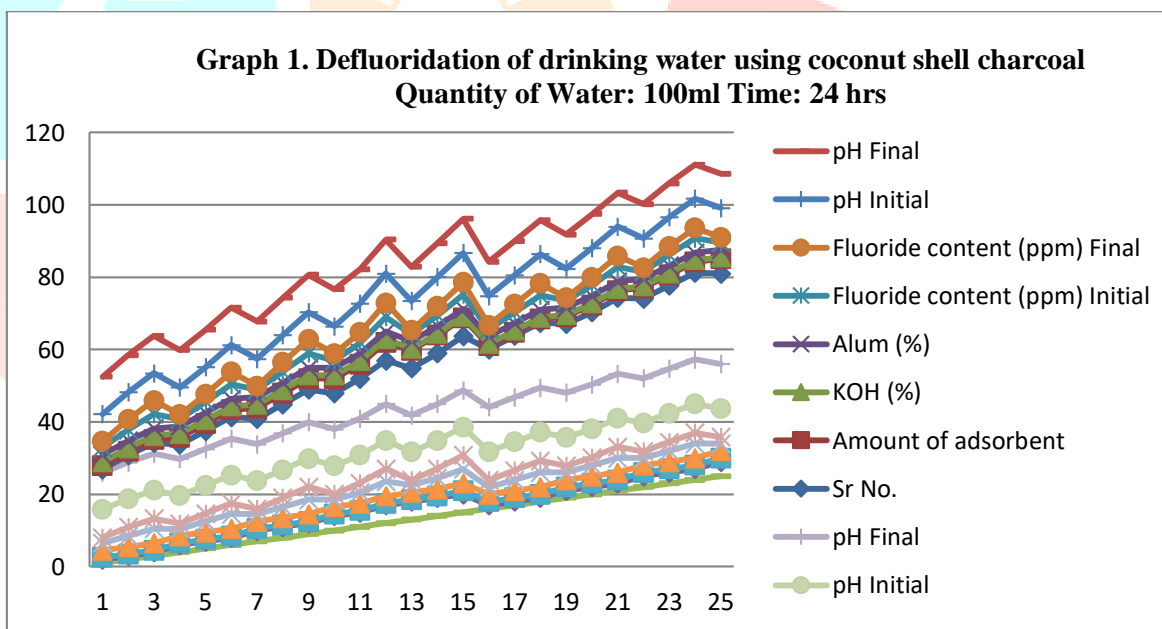
Fluoride is one of the pollutants that have been shown to cause significant effects in people through drinking water. Fluoride is beneficial in human body for the calcification of dental enamel and maintenance of healthy bones at low Conc. That is 0.5 to 1.5 mg/l (WHO 2004, 2008). But excessive exposure to fluoride in drinking water can give rise to a number of adverse effects. The method was developed for the removal of fluoride by using coconut shell charcoal and paddy husk charcoal.

Materials and Methods

Each adsorbent such as coconut shell charcoal and paddy husk charcoal was ground into fine powder. The suitable weight of adsorbent was taken in a polythene container and 100 ml of standard sodium fluoride solution was added. To this 1% potassium hydroxide and 2% alum solution were added and shaken well. This mixture was allowed to stand for 24 hrs and filtered through Whatmann No.42 filter paper. Then the presence of fluoride content in the filtrate was detected using UV-VIS spectrophotometer. The experiment was repeated by changing the weight of charcoal and alkali to find out the effectiveness of adsorbent. The drinking water samples were collected from nearby areas.

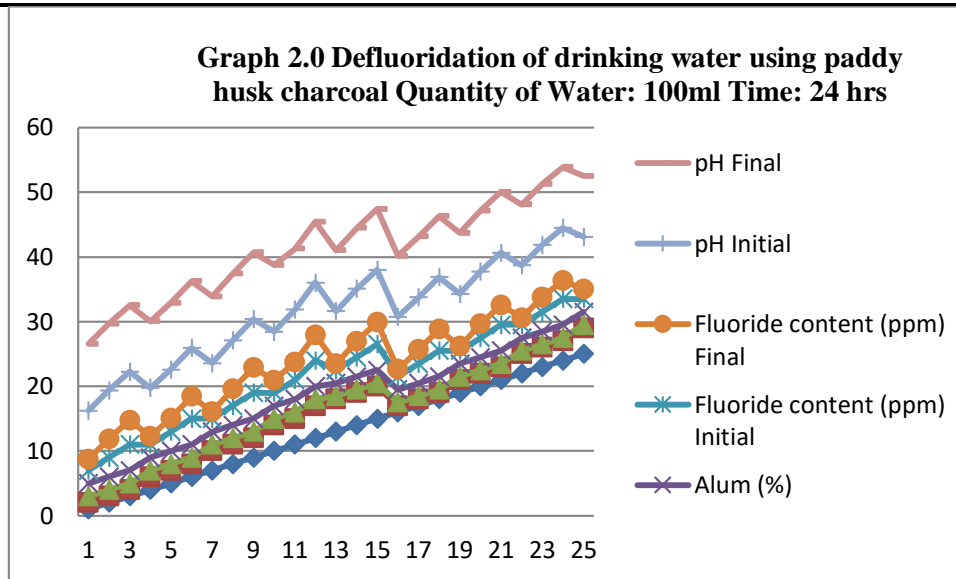
Result and Discussion

The experimental values are given in tables 01-02 and graph 01-02. The values of the experiment show that both adsorbents but alkalinity of the resultant water increased reduced the fluoride concentration. Hence, this method cannot be directly used for domestic purpose and is used for academic purpose only (Bhakuni *et al.*, 1974 and Viswanatham *et al.*, 1974).



Sr No.	Amount of adsorbent	KOH (%)	Alum (%)	Fluoride content (ppm)		pH	
				Initial	Final	Initial	Final
1	1	0.5	2	2	1.53	7.8	10.1
2	1	0.5	2	3	2.43	7.8	10.1
3	1	0.5	2	4	2.81	7.8	10.1
4	2	0.5	2	2	1.39	7.8	10.1
5	2	0.5	2	3	2.15	7.8	10.1
6	2	0.5	2	4	2.98	7.8	10.1
7	3	0.5	2	2	1.45	7.8	10.1
8	3	0.5	2	3	2.50	7.8	10.1
9	3	0.5	2	4	3.55	7.8	10.1
10	4	0.5	2	2	1.55	7.8	10.1
11	4	0.5	2	3	2.55	7.8	10.1
12	5	0.5	2	4	3.58	7.8	10.1
13	5	0.5	2	2	1.42	7.8	10.1
14	5	0.5	2	3	2.57	7.8	10.1
15	5	1.0	2	4	3.80	7.8	10.1
16	1	1.0	2	2	1.91	7.9	12.3
17	1	1.0	2	3	2.64	7.9	12.3
18	1	1.0	2	4	3.26	7.9	12.3
19	2	1.0	2	2	1.89	7.9	12.3
20	2	1.0	2	3	2.13	7.9	12.3
21	2	1.0	2	4	3.12	7.9	12.3
22	3	1.0	2	2	1.87	7.9	12.3
23	3	1.0	2	3	2.47	7.9	12.3
24	3	1.0	2	4	3.05	7.9	12.3
25	4	1.0	2	2	1.85	7.9	12.3

Table.01: Defluoridation of drinking water using coconut shell charcoal Quantity of Water : 100ml Time: 24 hrs



Sr No.	Amount of adsorbent	KOH (%)	Alum (%)	Fluoride content (ppm)		pH	
				Initial	Final	Initial	Final
1	1	1	2	2	1.73	7.5	10.3
2	1	1	2	3	2.87	7.5	10.3
3	1	1	2	4	3.74	7.5	10.3
4	2	1	2	2	1.25	7.5	10.3
5	2	1	2	3	2.10	7.5	10.3
6	2	1	2	4	3.42	7.5	10.3
7	3	1	2	2	1.09	7.5	10.3
8	3	1	2	3	2.58	7.5	10.3
9	3	1	2	4	3.87	7.5	10.3
10	4	1	2	2	1.94	7.5	10.3
11	4	1	2	3	2.75	8.1	9.4
12	5	1	2	4	3.93	8.1	9.4
13	5	0.5	2	2	1.01	8.1	9.4
14	5	0.5	2	3	2.46	8.1	9.4
15	5	0.5	2	4	3.42	8.1	9.4
16	1	0.5	2	2	1.14	8.1	9.4
17	1	0.5	2	3	2.17	8.1	9.4
18	1	0.5	2	4	3.31	8.1	9.4
19	2	0.5	2	2	0.69	8.1	9.4
20	2	0.5	2	3	2.14	8.1	9.4
21	2	0.5	2	4	3.05	8.1	9.4
22	3	0.5	2	2	1.10	8.1	9.4
23	3	0.5	2	3	2.28	8.1	9.4
24	3	0.5	2	4	2.86	8.1	9.4
25	4	0.5	2	2	1.50	8.1	9.4

Table. 02: Defluoridation of drinking water using paddy husk charcoal Quantity of Water: 100ml Time: 24 hrs

Conclusion

Drinking water samples collected from the local water suppliers tanks were tested for Defluoridation with the help of two methods of charcoal test. It's found that similar and positive result were recorded in both that is in coconut shell charcoal and paddy husk charcoal test in 100 ml of water for 24 hr test.

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