

Analysis of fluoride in the water of bore-wells of Azamgarh city, U.P

Shafqat Alauddin

Environmental Research Lab, Shibli National College, Azamgarh-276001, U.P., India.

ARTICLE INFO

Article history:

Received: 30 October 2012;

Received in revised form:

15 April 2016;

Accepted: 21 April 2016;

Keywords

Fluorosis.

Dental caries.

ABSTRACT

The presence of excessive amount of fluoride in bore wells and drinking water causes dental fluorosis, mottling of teeth etc. Ground water contains fluoride ions dissolved from geological formations. The presence of low concentrations or absence of fluoride in water results in a high incidence of dental caries in children's teeth. Therefore the concentration of fluoride should be within permissible limit as prescribed by various organizations such as ICMR, WHO, BIS etc. Hence, it becomes very important to analyze the fluoride in the water of bore-wells for used drinking purpose. In the present study, fluoride content has assessed by standard analytical procedures and found in the range 0.008 to 0.615 ppm at different sampling stations of Azamgarh city during Jan 2012 to July 2012.

© 2016 Elixir All rights reserved.

Introduction

Water is an important part of our environment. All the living creatures depend upon water in one way or the other but there are instances that civilizations have disappeared due to shortage of water or due to water born diseases. Today water has become essential commodity for the development of industries and agriculture.

The general surveys reveals that total surface area of earth is about 51.00 crore sq kilometers out of which 36.01 crore sq kilometers is covered by sea. Addition to this, we get water from rivers, lakes, tanks and snow in hills. About 15.00 crore cubic kilometers of water is also found on the average layers of the earth. Although it is surprising but true that in spite of such abundance there is soft water in the world. And also become very precious and scare, mainly due to the increase in human population and fast development. The inadequate and irregular water supply through piped water system has forced the population to use whatever quality of water available in nearby water sources; this often leads to water borne diseases and other serious health hazards. It is therefore essential to monitor the water supply as well as quality of water.

Specially, the fluoride content in the water above permissible limit causes dental fluorosis, skeletal fluorosis and other serious teeth disorders. The optimum fluoride concentration in water protects teeth from decay without causing remarkable fluorosis. Fluoride ingested with water is almost completely absorbed and distributed rapidly throughout the body, with main retention in the bones and a small portion in the teeth. The deeper aquifer contains high fluoride up to 1.33 ppm [1, 2] while the value of 0.5 to 1.0 ppm has recommended by WHO [3].

Materials And Methods- In this study attempts were made to assess the fluoride content in drinking water samples collected from various sampling stations of Azamgarh city of Uttar Pradesh during Jan 2012 to July 2012. The details of which are given in the table-1

Table-1

Details of sampling stations

S.No.	LOCALITY	SAMPLING STATION	OWNER OF THE BORE-WELL
1.	SIDHARI	SS1	Mr. A. W. ABBASI
2.	MADHYA	SS2	Dr. R. SINGH
3.	RAIDOPUR	SS3	Dr. B. N. SRIVASTAVA
4.	AILWAL	SS4	Mr. O. N. AGRAWAL
5.	MATBAR GANJ	SS5	Dr. D. K. TRIPATHI
6.	KATRA	SS6	Mr. R. K. AGRAWAL
7.	PANDEY BAZAR	SS7	Mr. N. AHMAD
8.	MILLAT NAGAR	SS8	Dr. J. AKHTAR
9.	HEERA PATTI	SS9	Mr. S. K. SRIVASTAVA
10.	KOT	SS10	Mr. A.K. GUPTA

Water samples of bore-wells were collected from above mentioned sampling stations of Azamgarh city by using Standard sampling procedure. The samples were collected during Jan 2012, March 2012, May 2012 and June 2012 and simultaneously analyzed for their fluoride content.

In the acidic medium zirconium reacts with alizarin Red-S to form violet complex, which is bleached on the addition of fluoride ion and colour changes from red violet to yellow green [4]. 100 ml of filtered sample is taken and sodium arsenite solution is added to the filtered sample, then 5 ml of Zirconyl acid solution was added to it for the removal of SO_4^{2-} interference, followed by the addition of Alizarin Red -S now, wait for at least one hour. Measure the intensity of light at 570 nm and calculate the concentration with the help of standard curve The above mentioned analytical procedure is followed as prescribed by APHA [5,6].

Results And Discussions- The results of analysis of fluoride content in the water samples of bore wells of Azamgarh city are summarized in Table-2. The analysis report revealed that, the

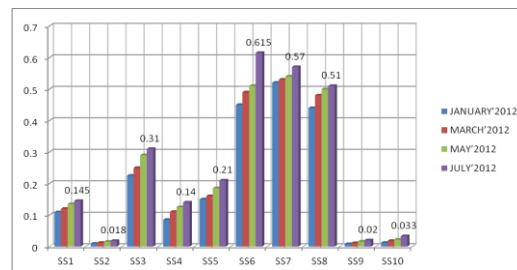
Table-2
Flouride concentrations* of different bore wells

SAMPLIN G STATION	JANUARY'201 2	MARCH'201 2	MAY'201 2	JULY'201 2
SS1	0.109	0.120	0.135	0.145
SS2	0.009	0.012	0.015	0.018
SS3	0.225	0.250	0.290	0.310
SS4	0.085	0.110	0.125	0.140
SS5	0.150	0.160	0.185	0.210
SS6	0.450	0.490	0.510	0.615
SS7	0.520	0.530	0.540	0.570
SS8	0.440	0.480	0.500	0.510
SS9	0.008	0.011	0.016	0.020
SS10	0.012	0.018	0.022	0.033
MINIMUM VALUE	0.008	0.011	0.015	0.018
MAXIMU M VALUE	0.520	0.530	0.540	0.615

*Fluoride concentration in ppm

fluoride content in water samples taken from the bore wells ranges from 0.008 to 0.615 ppm at different sampling stations. Fluoride in water results in a substantial reduction in dental caries in children and adults. It is always been desirable in water if the limit is below 0.6 ppm. In the case if the limit is more than the threshold limits the water source cannot be discarded as such but some health measures should be taken to correct the water of that source.

In the present study fluoride concentration is found within the prescribed limit. Apart from rock forming minerals which on weathering can contribute to the fluoride content in ground water, the use of phosphoric fertilizers in agriculture and industrial effluents can enhanced the fluoride concentration of ground water [7]. Fluoridation may be suggested in case water of the low fluoride concentration of ground water[8].



Acknowledgement- Author is thankful to the Chairman, Department of Chemistry and Principal, Shibli National College, Azamgarh for providing necessary laboratory facilities.

References-

1. Khadsan, R. E.,(2007),Analysis of fluoride in borewells water of Chikhli City, Dist. Buldana (M.S.), Journal of Ultra Chemistry,3(1),p 93-95
2. Handa, B. K. (1988), Fluoride occurrence in natural water in India and its significance, Bhujal News, 3(2), p 3-7
3. WHO, International Standards for drinking water, (1971), 3rd Edition ,WHO, Geneva
4. Megregian, S., (1954) Rapid spectrophotometric determination of fluoride with zirconium eriochrome cyanine R lake, Anal. Chem 26, p 1167-1166.
5. APHA, (1993), Standard methods for the examination of water and waste water, 16th Edition, American Public Health Association, Washington DC 2005
6. Manivaskam, N., (1996), Physico-Chemical Examination of Water, Sewage and Industrial Effluents, Pragati Prakashan. 3rd Edition, p 83-88
7. Handa, B. K. (1975), Geochemistry and genesis of fluoride containing ground water in India, Groundwater, 13(3), p 275-281.
8. Kataria, H. C.,(2006), Assessment of fluoride in groundwater of Bhopal (M.P.), Ultra Chemistry,2(1),p109-111