Research Article

Determination of Fluoride in Anaparthi Mandal (Rural Area)

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ABSTRACT
The object of the present study is to carry out the Physico – Chemical analysis of well and bore well water samples from fourteen sampling stations of Laksminarasapuram (Rural area) in the vicinity of Anaparthi mandal , East godavari District(AP) on 12th of every month (for a period of six months) from September 2011 to February 2012. The analysis of different parameters namely- temperature, pH, color and fluoride were carried out as per standard methods. The results indicate that the fluoride content in all the sampling stations was foundf within the permissible levels as per WHO standards.

Keywords: Fluoride content - Laksminarasapuram (Rural Area)-Anaparthi - East godavari District.

INTRODUCTION

Fluoride is a naturally occurring compound derived from fluorine, the 13th most abundant element on earth's crust[1]. It is generally present in almost all foods and beverages including water, but levels of which can vary widely. Fluoridation is the addition of fluoride compounds into drinking water, to adjust concentrations to levels between 0.8 and 1.0 mg/lt for the beneficial effect of tooth decay prevention. The fluoride accumulation of ground water varies according to the source of water, geological formulation of the area and amount of rain fall etc. The concentration in seawater averages 1.3 ppm. Fresh water supplies generally contain between 0.01–0.3 ppm, whereas the ocean contains between 1.2 and 1.5 ppm.[2] In some locations, the fresh water contains dangerously high levels of fluoride, leading to serious health problems.

Low concentrations of fluorides (0.6-1.5 ppm) provide protection against dental caries, especially in children[3]. Fluoride can also have an adverse effect on tooth enamel and may give rise to mild dental fluorosis[4]. In India, approximately 62 million people including 6 million children suffer from the same problem because of high consumption of high fluoride content[5]. Longer exposure leads to certain types of bone diseases. Statistics reveal that fluoride poisoning is more spread than the Arsenic contamination in ground water in the country[6]. Keeping in view of this, it is proposed to carry out a systematic study on the determination of fluoride content of ground water resources of Laksminarasapuram (Rural), Anaparthi mandal , EG. Dt AP,

MATERIALS AND METHODS

Water samples(Bore Well & Open well) collected from 14 sampling stations selected for the analysis were given bellow: S_1-Vivekananda School area, S_2-Bhagya lakshmi Rice mill Area, S_3 - Spring mill Area, S_4-New colony area, S_5-Raju street, S_6-Dubulu Cheruvu ,S_7-Ramalayam,S_8-Gramapanchayath office,S_9-AnganwadiSchool, S_{10}-Burullamma temple, S_{11}-APRJC school, S_{12}- Near bus stop, S_{13}-Kama street and S_{14}- Community hall in the vicinity of Anaparthi mandal , East godavari Dt. AP. Water samples were collected in clean polythene bottles (2 or 5 liters capacity). Bottles were cleaned with hydrochloric acid then washed with tap water and then rinsed with distilled water twice and again rinsed with the water sample to be collected and field up one-liter bottles with the water samples . All the reagents used

was are analytical grade.DD water was used throughout the study. The procedures adopted for the estimation of various physical and chemical parameters as described in the standard methods[7]. All the chemicals, reagents used in this work were of analytical grade E. Merck, India.
Samples for analysis were collected in sterilized bottles using the standard procedure for grab (or) catch samples in accordance with standard methods of APHA (1995) while collection temperature of these areas was noted by 110^0C thermometer. The analysis of parameters namely pH, temperature and fluoride were carried out – as per the methods described in APHA (1995).Determination of Fluoride has been carried out using fluoride ion selective electrode. All the chemicals and reagents used were of analytical grade. D.D water was used for the preparation of solutions.

Results and discussion
The results obtained on of various parameters has been are presented in Tables – 1 to 6.

Temperature
All bio-chemical reactions in aquatic organisms are affected by temperature. A rise in temperature of water leads to the speeding up of chemical reactions in water, reduces the solubility of gases and amplifies the tastes and odours. The average temperature of the present study ranged from 26.7 - 28.2^{0}C.

It is an important factor in water analysis. It is known that pH of water (6.5 to 8.5) lower than 5.0 produces sore taste and has higher value above 8.5 is of alkaline taste. The pH values of the present investigation were within the prescribed standards for potable water (7.0 – 8.5). for potable water

Fluoride
Fluoride salts are used in the manufacture of many inorganic chemicals, many of which contain fluoride covalently bonded to the metal or nonmetal in question. Fluoride bearing rocks such as fluorspar, cryolite, fluorspatite and hydroxylapatite etc are the major sources of fluoride in ground water. Excess fluoride consumption affects plants and animals. Fluoride-containing compounds are so diverse that it is not possible to generalize on their toxicity, which depends on their reactivity and structure, and in the case of salts, their solubility and ability to release fluoride ions.

CONCLUSIONS
Out of 14 sampling stations studied in all most 13 stations, fluoride concentration remained with in the permissible limits for drinking water. On the other hand in the remaining one sampling station (S_8) the fluoride content is slightly lower than 0.6 ppm as per the permissible limits prescribed by WHO standards.

Table 1: Physico–Chemical Parameters of Water Samples Collected in September 2011

Station No.	Temperature (^{0}C)	Color	pH	Fluoride (ppm)
S1	28.0	Color less	7.36	0.95
S2	26.8	Color less	7.42	0.98
S3	27.4	Color less	8.20	0.72
S4	27.6	Color less	7.58	0.74
S5	28.1	Color less	7.35	0.67
S6	27.5	Color less	7.64	1.02
S7	27.8	Color less	7.81	0.83
S8	27.9	Color less	8.08	0.55
S9	26.8	Color less	6.97	1.22
S10	27.4	Color less	7.80	1.15
S11	27.5	Color less	7.62	1.09
S12	27.8	Color less	7.51	1.18
S13	26.8	Color less	7.24	1.05
S14	27.8	Color less	8.02	1.13

* All the values are the average of 3 determinations.

Table 2: Physico–Chemical Parameters of Water Samples Collected in October 2011

Station No.	Temperature (^{0}C)	Color	pH	Fluoride (ppm)
S1	27.2	Color less	7.32	1.02
S2	26.8	Color less	7.45	0.83
S3	27.4	Color less	8.10	0.79
S4	27.8	Color less	7.68	0.56
S5	28.1	Color less	7.39	0.77
S6	27.5	Color less	7.62	1.02
S7	27.8	Color less	7.81	0.62
S8	27.4	Color less	8.05	0.73
S9	26.7	Color less	7.27	1.02
S10	27.2	Color less	7.50	1.21
S11	27.5	Color less	7.62	1.08
S12	27.8	Color less	7.55	1.21
S13	26.9	Color less	7.24	1.08
S14	27.8	Color less	8.02	1.10

* All the values are the average of 3 determinations.

Table 3: Physico – Chemical Parameters of Water Samples Collected in November 2011

Station No.	Temperature (^{0}C)	Color	pH	Fluoride (ppm.)
S1	27.2	Color less	7.30	0.73
S2	26.9	Color less	7.44	0.64
S3	27.1	Color less	7.82	0.82
S4	27.5	Color less	7.50	0.86
S5	27.7	Color less	7.84	0.75
S6	27.3	Color less	7.62	0.69
S7	27.8	Color less	8.20	0.65
S8	27.4	Color less	8.04	0.54
S9	26.8	Color less	7.03	1.02
S10	27.2	Color less	7.21	1.25
S11	26.7	Color less	7.58	1.12
S12	27.8	Color less	7.51	1.04
S13	26.9	Color less	7.31	1.13
S14	27.5	Color less	8.05	1.25

* All the values are the average of 3 determinations.

Table 4: Physico -Chemical Parameters of Water Samples Collected in December 2011

Station No.	Temperature (^{0}C)	Color	pH	Fluoride (ppm)
S1	27.8	Color less	7.86	0.82
S2	26.9	Color less	7.54	0.63
S3	27.4	Color less	7.84	0.59
S4	27.8	Color less	7.63	0.79
S5	27.3	Color less	7.52	0.57
S6	27.5	Color less	7.09	0.99
S7	27.8	Color less	8.11	0.72
S8	27.4	Color less	8.04	0.44
S9	26.8	Color less	6.93	0.79
S10	27.2	Color less	7.22	0.73
S11	28.0	Color less	7.54	0.84
S12	27.8	Color less	7.51	0.92
S13	26.9	Color less	7.42	0.72
S14	27.5	Color less	8.05	0.86

* All the values are the average of 3 determinations.

Table 5: Physico- Chemical Parameters of Water Samples Collected in January 2012

Station No.	Temperature (^{0}C)	Color	pH	Fluoride (ppm)
S1	27.5	Color less	7.76	0.76
S2	26.7	Color less	7.59	0.81
S3	27.4	Color less	7.80	0.62
S4	27.8	Color less	7.73	0.75
S5	27.3	Color less	7.22	0.57
S6	27.5	Color less	7.65	0.83
S7	27.2	Color less	7.80	0.62
S8	27.5	Color less	8.04	0.66
S9	26.8	Color less	6.97	1.02
S10	27.5	Color less	7.43	0.96
S11	27.3	Color less	7.24	0.71
S12	27.2	Color less	7.35	1.15
S13	26.9	Color less	7.54	0.98
S14	27.6	Color less	7.65	0.75

* All the values are the average of 3 determinations.

Table 6: Physico – Chemical Parameters of Water Samples Collected in February 2012

Station No.	Temperature (^{0}C)	Color	pH	Fluoride (ppm)
S1	27.8	Color less	7.65	0.96
S2	27.5	Color less	7.45	1.04
S3	28.2	Color less	7.80	0.79
S4	28.0	Color less	7.72	0.77
S5	27.9	Color less	7.34	0.55
S6	27.9	Color less	7.48	0.69
S7	27.5	Color less	8.20	0.8
S8	28.1	Color less	8.14	0.69
S9	27.5	Color less	7.95	1.05
S10	26.7	Color less	7.71	1.20
S11	27.5	Color less	8.14	1.22
S12	27.8	Color less	7.58	1.18
S13	28.1	Color less	8.03	1.05
S14	26.8	Color less	7.92	1.25

* All the values are the average of 3 determinations.

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