



Physico-Chemical Studies of Fluoride in ground water of Sindkhed Raja, District Buldana (M.S.)

H. B. Nagre¹, A. M. Zine², D.D. Kayande³.

1-Department of Chemistry, Vivekanand College, Aurangabad (M.S.)

2-Department of Chemistry, Vinayakrao Patil College, Vaijapur (M.S.)

3. Department of Chemistry, S. B. Science College, Aurangabad (M.S.)

ABSTRACT:

Major parts in the world are facing various health problems concerned with the quality of drinking water. Pollution by heavy metals, pesticides, hardness, TDS are some important contributing factors to the water pollution. Increased fluoride concentrations are also one of the serious menace found in drinking water samples. For the study of fluoride levels in drinking water 40 ground water samples were collected from different areas of 20 villages of Tahsil Sindkhed Raja of district Buldhana (M.S.). They were analyzed for fluoride content. The maximum fluoride concentration was found to be 2.3 ppm and the minimum concentration found was 0.7 ppm.

Key words: Fluoride, tooth decay, fluorosis, dug well, bore well.

INTRODUCTION:

The increased fluoride concentration in ground water resources has now become a major health related problem in many countries. The whole world, more or less is suffering from this geochemical issue. More than 15 states and 100 districts in India are suffering from fluoride content in drinking waters. The natural sources of Fluoride ion are from rock minerals. Its concentration depends upon type of rock strata porosity of rocks, temperature, rain-fall, vegetation, oxidation-reduction potential, chemical composition of rocks, pH and also depth of



water. The main source of Fluoride ions is Fluorapatite. The number of samples contain higher concentrations of Fluoride and hence villagers are facing acute health problems like teeth mottling, skeletal fluorosis etc. The immense use of phosphatic fertilizers and also pesticides contribute in increasing fluorides in water samples.

EXPERIMENTAL:

The fourty water samples were collected from twenty villages of selected area during September to November 2015. Sampling was done at morning at about 10.00 A.M.

APHA (American Public Health Association) sampling procedure was followed for the collection of samples. The sterilized plastic cans were used for the sample collection.

The determination of fluoride was done by using Ion Selective Electrode. ANALAR grade reagents as well as de-ionized water were used for preparation of reagents and solutions.

RESULTS AND DISCUSSION:

Fluoride is a natural Pollutant. Rock mineral sources like Fluorspar, CaF_2 are one of the natural contributing sources. However phosphate from NPK fertilizers may also contribute to some extent. When rain water percolates through the soil, some minerals are leached with it. If we consider dug well samples and bore well samples, no special demarcation is found in their values.

Fluoride is essential for our body at low concentrations. Its recommended (desirable) concentration is 1.0 ppm. Acceptable concentration is 1.5 PPM; beyond this it is harmful for health. It affects mottling and color charge of teeth. If fluoride concentrations further increases there are dental fluorosis pain in the joints and deformation of bones (skeletal fluorosis) also occur of higher stages (Table 1).

The average annual rainfall in selected area is about 79.2 cm. No much construction of Dams and Canals. However maximum area is under cultivation by using dug wells and some bore wells. The main source of water for drinking is from Dug Wells and Bore Wells.



In our 40 samples under investigation, minimum fluoride level is found to be 0.6 ppm and maximum was 2.3 ppm as shown in Table 2. No systematic pattern was seen in increase or decrease of fluoride. Out of 40 samples 20 samples are up to 1.00 ppm, 14 samples are up to 2.0 ppm and 6 are at higher level.

From the study it reveals that these drinking water sources must be processed for defluorination techniques like filtration, reverse osmosis, use of activated alumina etc before its use for drinking purposes.

Table No. 1

Fluoride Concentrations in ppm	Effect
0.0 to 0.6	Dental caries
0.6 to 1.0	Desireable
1.0 to 1.5	Admissible
1.5 to 3.0	Dental fluorosis
3.1 to 6.0	Mild skeletal Fluorosis
6.0 to more	Crippling Skeletal Fluorosis

Table No. 2

Sr. No.	Name	Sampling Site	Type of Sample	Depth in feet	Fluoride Conc. in ppm
01.	Sindkhed Raja	S1	Dug Well	60	0.85
		S2	Bore Well	300	0.8



02.	Shivni	S3	Dug Well	50	0.8
		S4	Bore Well	200	0.9
03.	Pangerkheda	S5	Dug Well	55	0.9
		S6	Bore Well	260	1.1
04.	Chincholi	S7	Dug Well	45	1.3
		S8	Bore Well	300	0.8
05.	Sondev	S9	Dug Well	60	1.0
		S10	Bore Well	250	1.1
06.	Maherkha	S11	Dug Well	65	1.6
		S12	Bore Well	250	0.7
07.	Wagora	S13	Dug Well	40	1.6
		S14	Bore Well	200	1.6
08.	Hanutkheda	S15	Dug Well	45	0.9



		S16	Bore Well	225	0.7
09.	Savkhed	S17	Dug Well	60	0.8
		S18	Bore Well	300	0.9
10.	Ogla	S19	Dug Well	65	0.95
		S20	Bore Well	350	1.0
11.	Jalgaon	S21	Dug Well	70	1.8
		S22	Bore Well	350	1.9
12.	Kingaon	S23	Dug Well	75	0.9
		S24	Bore Well	300	1.0
13.	Waghjai	S25	Dug Well	65	2.2
		S26	Bore Well	300	2.3
14.	Pimparkheda	S27	Dug Well	65	2.3
		S28	Bore Well	250	2.3



15.	Umraj	S29	Dug Well	40	2.1
		S30	Bore Well	200	2.2
16.	Izora	S31	Dug Well	45	1.0
		S32	Bore Well	300	1.9
17.	Nimgaon	S33	Dug Well	50	1.6
		S34	Bore Well	300	1.6
18.	Pangari	S35	Dug Well	45	0.95
		S36	Bore Well	350	1.4
19.	Jambora	S37	Dug Well	60	1.6
		S38	Bore Well	350	1.7
20	Raheri	S39	Dug Well	65	1.5
		S40	Bore Well	350	1.0



ACKNOWLEDGEMENT:

The authors are thankful to the Head, Department of Chemistry, and also to the Director, C.P.E. (College with Potential for Excellence) of Vivekanand Arts, S.D. Commerce and Science College, Aurangabad, for their kind cooperation.

REFERENCES:

- [1] Jha and Poddar, Fluoride content in ground water J. fresh water biology 9(2) 98, 1997.
- [2] ICMR manual of standards of Quality for Drinking water supplies, Spl. Ref. S. No. 44. New Delhi.
- [3] Toxic properties of fluorine compounds, Elsevier Publications Company Ltd. London.
- [4] APHA standard methods for examination of water and waste water, 17th edition.
- [5] Standard methods for examination water and waste water, American Public Health Association and Water Pollution Control Federation Edn. 16, 1989.
- [6] C.R. Vishwanathan, G. R. Rao, comparative study of various materials used for defluorination of waters, symposium on fluorosis, Hyderabad. P. 218 (1998)
- [7] R. K. Trivedi and P. K. Goel, chemical and biochemical methods for water pollution, Enviro Publication Karad (1986).
- [8] WHO Geneva report (1994)
- [9] C. K. Jain et. Al. Ground Water Pollution, Poll Res. 19 (2000)
- [10] Chemical characteristics of Ground Water in Nagpur District, Rajasthan, S.C. Gupta, Indian journal of Environ, Health, Vol 33, no. 3 (1991)
- [11] Surveillance of ground water quality in Madurai – A murgesan et.al.
- [12] Assessment of Drinking Water quality in Tiruchirapalli, W.P.S. Indira et.al.
- [13] Indian Standard Drinking water specifications Bureau of Indian standards New Delhi.



- [14] Physico Chemical studies of fluoride in ground water of Patan J.D. Joshi et.al.
- [15] Evaluation of Quality of Well waters in Udaypur District S.C. Gupta, Environ HHK, Vol 23, No. 3 195-202, 1991.
- [16] WHO, Fluorides and Human Health, World Health Organization. Tech. Rep. Geneva 1971.
- [17] Pollution level in Husain Sagar Lake of Hyderabad. Naga Prapurna et.al. Poll Rtes. 21 (2) 187-190 (2002)
- [18] Prevention and control of fluorosis, National Technology Mission of Drinking Water, AIIMS, New Delhi (1991)