

**Research Article**

## **Determination of Fluoride Content in River Water of Purna City**

**Masarrath Unnisa Sabri and A. B. Bhosle**

School of Earth Sciences,  
SRTM University, Nanded.  
Maharashtra, India

[Received 20 July-2021, Accepted 29 Aug-2021, Published 9 Oct-2021] DOI: 10.5281/zenodo.5644446

### **ABSTRACT**

Water is the common name applied to the liquid form (state) of the hydrogen and oxygen compound H<sub>2</sub>O. Pure water is an odorless, tasteless, clear liquid. Water is one of nature's most important gifts to mankind. Essential to life, a person's survival depends on drinking water. Water is one of the most essential elements to good health, it is necessary for the digestion and absorption of food; Helps maintain proper muscle tone; supplies oxygen and nutrients to the cells; rids the body of wastes; and serves as a natural air conditioning system. Health officials emphasize the importance of drinking at least eight glasses of clean water each and every day to maintain good health. The investigation of fluoride element percentage was clearly done in the river water. Its experimental analysis was carried out by their respective standard methods widely applicable. While making a preliminary observation it was observed that the water samples from Purna River contained fluoride along with other trace elements. Out of all sampling stations studied in all most 1 sample, fluoride concentration remained within the permissible limits for drinking water. On the water hand in the remaining 11 samples the fluoride content is below the permissible limits prescribed by standards.

**Key words:** Environment, Fluoride, Water, Pollution, etc.

### **1. INTRODUCTION**

As far as we know, the earth is the only place in the entire universe where liquid water is found in considerable quantities[1], (Hickman et al., 1993; Cunningham and Saigo, 1997 [2]). In general it is believed that most of the earth's water has been formed from oxygen and hydrogen released from rocks through volcanic activity.

In the international agreements, water was implicitly considered to be a fundamental resource. Moreover, several of the explicit rights especially those guaranteeing the rights to food, health and development cannot be attained without guaranteeing access to clean water (9).

Water of good drinking quality is of fundamental importance to human physiology

as existence of life depends on its availability. Since river is a major source of water their water quality needs to be maintained. The water content of human embryo is nearly 90 percent which gradually reduces with physical growth and comes to about two third of the body weight in old age through the process of dehydration much alike the process by which a grape becomes a raisin (10).

Good quality drinking water may be consumed in any desired amount without adverse effect on health. Such water is called 'potable'. It is free from harmful levels of impurities: bacteria, viruses, minerals, and organic substances. It is also aesthetically acceptable, is free of unpleasant impurities, such as objectionable taste, color, turbidity, and odor (7).

Potable water is one that is safe to drink, pleasant in taste and suitable for domestic purpose. Drinking water must be free from major type of water pollutants which can be classified into microorganisms, organic wastes, plant nutrients, sediments or silts, inorganic chemicals, acids and bases, heat, radioactivity, heavy metals, pesticides and other industrial chemicals (8).

The requirement of potable water is essential to both the rural and urban population in order to prevent the health hazards. For water to be described as potable, it has to comply with certain physico-chemical standards which are designed to ensure that water is safe drinking (11).

## 2. Study Area

Purna is a town with a municipal council in Parbhani district in the Indian state of Maharashtra. Purna is located at 19.18°N 77.05°E. It has an average elevation of 386metres (1266 feet).

Purna is one of eight Talukas in Parbhani District the Indian state of Maharashtra. It is a town in the Marathwada region of Maharashtra.

## 3. Methodology

In the present investigation, for Fluoride content in the Municipal and River water we have selected the Purna city of Parbhani district. Purna Taluka is situated in Parbhani district of Marathwada region of Maharashtra. Population of this region is mainly dependent on the Municipal and River water to sustain. Therefore any major alteration in the physico-chemical characteristics of Municipal and River water of this region affects the day to day activities of peoples in this region adversely.

There are Municipal water sample and River water sample sites selected as per the Fluoride pollution sources and total 12 times on monthly basis i.e. April, 2014 to March, 2015 water samples were collected from the study of fluoride content in the collected Municipal water and River water. Samples are collected in the pre cleaned polythene container. The collected samples are transfer to the laboratory for further analysis. The fluoride is estimated by SPANDS method.

## 4. Result and Discussion

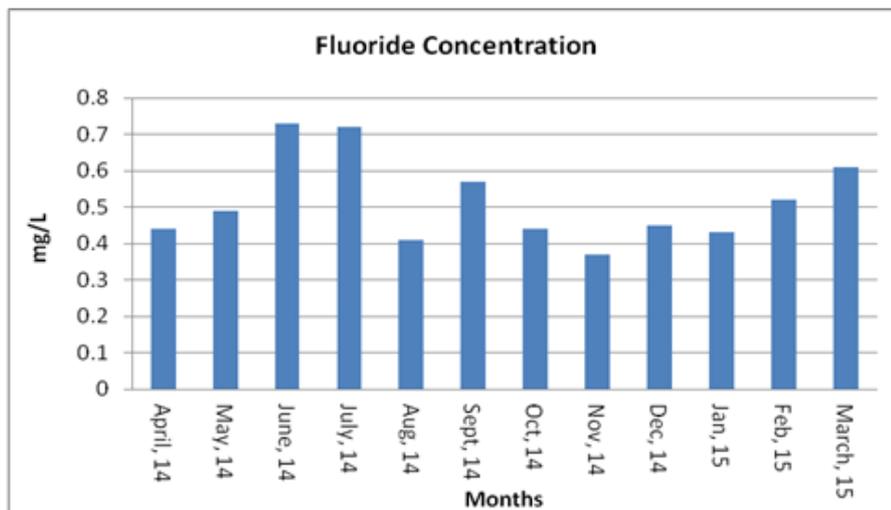
Fluoride exists fairly abundantly in the earth's crust and can enter ground water by natural processes; the soil at the foot of mountains is particularly likely to be high in fluoride from the weathering and leaching of bedrock with high fluoride content.

Fluoride compounds are salts that form when the element, fluorine, combines with minerals in soil or rock. Since some fluoride compounds in the earth's upper crust are soluble in water, fluoride is found in both surface water and ground water.

In the surface fresh water, however, fluoride concentrations are usually low (0.01 ppm to 0.3 ppm).

In the present work the fluoride content was noted during three different seasons i.e. summer, monsoon and winter respectively.

Seasonal variations of fluoride for about 1 year in the three different seasons i.e. summer, monsoon, winter has been shown in various tables and figure. When average fluoride values were calculated for three seasons it has been seen that fluoride in monsoon remains low and it gradually increases during summer and winter.



**Figure 1:** Fluoride variation of concentration from Purna River during April, 2014 to March, 2015.

Water is nature's most wonderful, abundant and useful compound and it is the basis of all lives-ecological resources for the flora and fauna of our earth and a fundamental necessity for all lives. From the Purna River F concentration observed minimum in winter season, was found 0.37 mg/litre. In summer season, maximum concentration of fluoride was found 0.73 mg/litre (Fig.1) .

## 5. CONCLUSION

The systematic investigation of fluoride element percentage was clearly done in the river water. Its experimental analysis was carried out by their respective standard methods widely applicable. While making a preliminary observation it was observed that the water samples from Purna River contained fluoride along with other trace elements.

Rainfall, the chief source for surface water, includes ponds, rivers, dam, lakes and streams. The present work is done to investigate the occurrence of fluoride in Purna River. Purna

River is surrounded by hilly region, various types of dense plants and agricultural lands, different types of soil forms. The surface run off contains various organic and traces elements which enter into Purna River itself. The sources of trace elements are agricultural activity, soil erosion and geology of surrounding region revealed. Excess fluoride

consumption affects plants and animals.

Out of all sampling stations studied in all most 1 sample, fluoride concentration remained within the permissible limits for drinking water. On the other hand in the remaining 11 samples the fluoride content is below the permissible limits prescribed by standards. It is observed from the above study that fluoride content in certain areas was below the levels than required. Since drinking water is a basic need, the people in those areas should consume protected water containing fluoride within the prescribed limits in order to prevent dental fluorosis for the future generation.

## REFERENCES

1. Jacobson, J.S. and Weinstein, L.H. (1977) Sampling and analysis of fluoride: Methods for ambient air, plant and animal tissues, water, soil and foods. *J. Occ. Med.* 19, 79-87.
2. Gupta, S.K. and Sharma, P. (1995) an approach to tackling fluoride problem in drinking water. *Current Science* 68, 774.
3. Rubel, F and Woosley, R.D. (1979) The removal of excess fluoride from drinking

- water by activated alumina. J.Amer. Water. Works Asso. 71, 45-49.
4. Rubel, F and Woosley, R.D. (1979) The removal of excess fluoride from drinking water by activated alumina. J.Amer. Water. Works Asso. 71, 45-49.
  5. Sen, A Rao, K.K. Frizzell, M A and Rao, G. (1998) A low-cost device for the estimation of fluoride in drinking water, Field Anal. Chem. Tech., 2, 51-58.
  6. WHO (1996) WHO guidelines for drinking water quality. Vol 2, 2<sup>nd</sup> edition, Geneva.
  7. Sasikaran S, Sritharan K, Balakumar S, Arasaratnam V. Physical, chemical and microbial analysis of bottled drinking water. Ceylon Med J. 2012;57:111–116.
  8. Saini Randeep Singh. (2006). A Handbook on Air, Water and Land Pollution. B.R. Publishing Corporation, Delhi –110 052.
  9. Gleick, Peter (1999) 'The Human Right to Water', Water Policy, Vol.I,No.5,pp, 487-503.
  10. Rajvaidya & Markandey, 1998. Advance In Environmental Science and Technology. Vol-4.A.P.H. Publishing Corporation. India. pp 235
  11. WHO (1984). Guidelines for drinking water quality, values 3; drinking water quality control in small community supplies (212p). Geneva: WHO.