

Equilibrium Sorption Studies for Fluoride content in Drinking Water of Bore wells of Warud Region on Ferronia Elefantum Fruit Shell

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ABSTRACT

Major water supply for agriculture and domestic purpose in Warud Region is from Upper Wardha and Shekhadari Dam Water. Even then, resident of most of the areas are mainly dependent on bore well water for domestic and Agriculture purpose especially in summer season. Hence large numbers of bore wells are existed. Fluoride content of selected bore-well water in an around of Warud was analyzed in the month of May, 2011. The study reveals that the fluoride concentration is within the permissible limits in few places as prescribed by BIS and WHO. But in some places it is more than prescribed by BIS and WHO. Hence it is essential to remove these excess fluorides by adsorption.

Key words: Bore well water Fluoride concentration, Fluorosis Adsorption

INTRODUCTION

Warud is a Taluka place located on the border of Maharashtra and M.P. States. It is situated at the base of satpuda Ranges and covered by dense woods with many medicinal plants and water bodies. It is famous for oranges and commonly known as "California of Vidarbha". The major crops of the district is 'Oranges'. The famous historical and holy place salbardi is only 30Km, away from Warud. The main water supply is from Uppar Wardha Dam and Shekhadari dam water to this Warud Region.

Water is most common and important resource on the earth (Suther *et al.*, 2001). However, the availability of water varies from place and time to time. As a result, there is a persistent scarcity of water in many parts of the world. Exponential growth in population creates an ever increasing demand of water for irrigation, industry and domestic use (Shankar *et al.*, 2004, Wright 2007).

Due to the population growth of this area and in the villages, the scarcity of water arises especially during summer season Warud Region is famous for orange crops. Farmers of this area using 50% land for orange irrigation purpose. From last 100 years ago they are using water for irrigation purposes. Due to this water level of this region become deeper and deeper. Upper Wardha Dam water is insufficient to provide it for agriculture as

well as drinking purposes to this area. As a result, a large number of bore well existed in this area to meet the water demands. Now a days, these Bore well is 500 to 800 feet deep. it is found that water from these bore well contain fluoride. The poor quality or drinking water is more due to the contamination than due to natural inferiority of the sources. Fluorides are present in both surface water and ground water. Most of the fluoride found in ground water result from weathering and circulation of water in rocks and soils. The chemical quality of ground water varies even at short distances. This variation may be attributed to the variations in the hydro chemical process (Maniraju, 2006). Fluoride in small dosages has remarkable influence on the dental system inhibiting dental caries, while consumption of high dosage fluoride water causes fluorosis (Shukla *et al.*, 2004). In India about 62 million people including 6 million children, suffer from fluorosis due to high content of Fluoride in water (Susheela, 1990). The present analysis is an attempt to evaluate the fluoride content of bore well water in Warud Region.

Adsorbent Preparation

The Ferronia Elefantum Fruit Shell was first dried at a temperature of 160°C for 6 hours. After grinding it was sieved to obtain average particle size of 200 mesh. It was then washed several times with distilled water to remove dust and other impurities. Finally it was dried again in an oven at

50°C for hours. The adsorbent was then stored in desiccator for final studies.

MATERIAL AND METHODS

In the present study, fifteen bore well water samples of selected areas in and around Warud analyzed. The samples were collected in clean polythene bottles of 2 ltr. capacity. The bottles were first rinsed with distilled water and then two to three times by the sample water before collecting for analysis.

Initial Fluoride concentration in water samples were determined using the parameters prescribed in standard methods for the Examination of water and wastewater APHA (1995).

In reagent bottle two hundred ml. of this

Table 1: Fluoride ion concentration in bore well water samples before and after adsorption in ppm

Samples	Initial concentration	Final concentration of fluoride
S1	0.8	0.60
S2	0.9	0.65
S3	1.0	0.75
S4	0.95	0.67
S5	0.75	0.65
S6	0.89	0.82
S7	1.6	1.2
S8	0.85	0.65
S9	0.92	0.67
S10	0.56	0.50
S11	0.60	0.52
S12	1.32	0.95
S13	0.92	0.62
S14	0.97	0.67
S15	0.76	0.55

water is mix with 100 mg of Granular tree bark and shake for 3 hour. After shaking filteral it with whatmann filtered paper and content is analised and final flourides concentration is given in table 1.

RESULTS AND DISCUSSION

Fluoride has little significance in industrial water, where as ingestion of excess fluoride in drinking water can cause fluorosis (Shukla *et al.*, 2004), which affects the teeth and bones. Below the permissible, limits, it is an effective preventive of dental curies, but above the permissible limits may causes disfigurement of teeth and severe skeletal flurosos. Such water should be defluorinated to reduce fluoride concentration by the process of adsorption on Ferronia Elefantum Fruit shell to the acceptable levels for drinking purpose. The observed results were compared with the standard values of BIS and WHO (i.e. 0.6 – 1.5 ppm.)

CONCLUSION

The present analysis concludes that, the fluoride concentration (Table 1) of few samples are well within the permissible limits as prescribed by BIS and WHO and the results reveals that the some bore wells water of Warud are fit for drinking without any pretreatment for fluoride contents. But few sample cantain excess concentration than prescribed by BIS and WHO. These excess concentration were removed by adsorption of fluoride on FEFS. These cheap and efficient absorbents can carry to cater the need of population in the rural areas and the population in the industrial area where safe drinking water is not available. But other physico-chemical parameters of these borewells water have to be analyzed for its suitability.

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