

# DEFLUORIDATION OF WATER USING TAMARIND FRUIT COVER

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**Abstract-** *Urbanization and industrialization cause various changes in the environment and the resulting chemical and organic matter causes various harms to living things in this world and this harm also affects future generations. Fluoride, one of the wastes from the fertilizer industry and some manufacturing plants, mixes with water and causes various anatomical and various harms when it is ingested by organisms. Its concentration can be reduced more easily by the absorption method than by various methods to remove fluoride from water, this is called defluoridation. Fluoride, which has an opposite charge property, can be easily removed by a positively charged material. Part of this can be removed by absorption with an aqueous solution made from the cover of tamarind fruit.*

**Keywords:** *Fluorine, Defluoridation, Tamarind fruit cover.*

## I. INTRODUCTION

Water is an essential ingredient for all living things in the world and its demand is increasing day by day. Its nature is always dependent on the environment. The properties of organic and chemical compounds vary from their static properties due to changes in the environment. Thus causing various positive and negative harms to the organisms that consume that water. The nature of water is completely changed by discharging industrial effluents directly into aquifers and land without proper treatment. For a variety of reasons, heavy and non heavy chemical metals and alloys, such as nitrate phosphate, fluoride, etc., may be mixed with water. Various modern simple and primitive methods are used to remove this. For this, the allocation can be controlled by manipulating the best methods. Excessive intake of these substances results in health disorders such as dental and skeletal fluorosis. The World Health Organization reports the chemical composition of the water used, the fluoride concentration should be within 1.5mg/l. The absorption method is considered to be the best method to remove the fluoride concentration, as this absorption method produces a positively charged aqueous solution made from the cover of the tamarind fruit and thereby tests the concentration of the counter-fluoridated fluoride, and also find the optimum dosage of aqueous solution of tamarind fruit cover.

## II. METHODOLOGY

### A. Materials Required

- ❖ Tamarind fruit cover
- ❖ 1M HCL & 1N NaOH
- ❖ Sodium fluoride or Hydrogen fluoride.

### B. Fluoride

The general chemical formula of fluoride is  $F^-$  and it is inorganic, monatomic anion, which is typically white and at times colorless. Fluoride tastes bitter and is odorless. Fluoride naturally occurs in soil, water, and foods and is also synthetically manufactured for use in drinking water and numerous oral chemical products. Fluorosis can occur when exposed to excessive fluoride.

### C. Procedure

- ❖ Preparation of Standard NaF Solution
- ❖ Sample Collection
- ❖ Preserving the Sample
- ❖ Fluoride Test
- ❖ Tamarind Gel Preparation
- ❖ Treatment Process
- ❖ Treated Sample Collection.

#### STEP: 1 preparation of NaF solution

NaF is prepared by dissolving dilute sodium hydroxide solution and NaF powder separately in a solution saturated NaF solution.

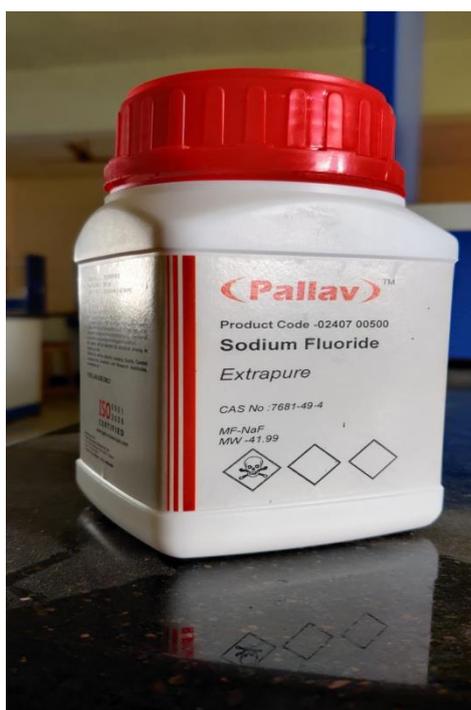


Figure 1 Sodium Fluoride

#### STEP: 2 SAMPLE COLLECTION

Water sample was collected from bore well in different zones of Chennai.

### **STEP: 3 Sample Preservation**

The water sample should be preserved at 4°C from the time of collection to the laboratory testing.

### **STEP: 4 Fluoride Test**

Fluoride in the water sample was tested by using water testing kit. The water testing kit consists of fluoride reagent, measuring jar, test tube, fluoride color chart.

#### **Fluoride Test Procedure**

- ❖ 5ml of water sample was taken in the test tube.
- ❖ Fluoride reagent was shaken well and then 5 drops were added to the water sample.
- ❖ The content was well mixed.
- ❖ The color that forms was compared with the Fluoride color chart and the Fluoride value was recorded.

### **STEP: 5 Tamarind fruit cover Gel Preparation**

Tamarind fruit cover was washed and dried in an oven at 105-110<sup>0</sup>C about 30 minutes. Then, the dried fruit cover was powdered. This powdered dried fruit cover was soaked in 1M HCL for 24 hours. Later, it is neutralised with 50 ml of 1 N of NaOH. It was dried in hot air oven at 105-110<sup>□</sup>C for about 6 hours and cooled at room temperature in dessicator.



**Figure 2 Tamarind fruit cover gel**

### **STEP: 6 Treatment Process**

500mg of Tamarind gel and 100ml of water were taken in a container and it is shaken well until the equilibrium of the solid-solution mixture is obtained. After attaining equilibrium, the mixture is filtered.

### **STEP: 7 Treated Sample Collection**

After filtration, the treated sample was collected and taken in a test tube for analyzing the sample.

## **III. RESULTS AND DISCUSSIONS**

5 ml of treated sample was taken in a container. Fluoride reagent was shaken well and then 5 drops were added to the treated water sample. The content was well mixed. The colour that forms was compared with the Fluoride colour chart and the Fluoride value was recorded.

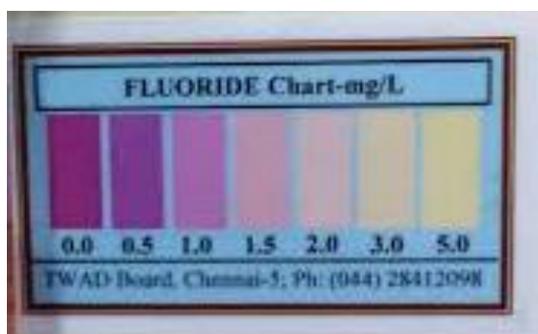
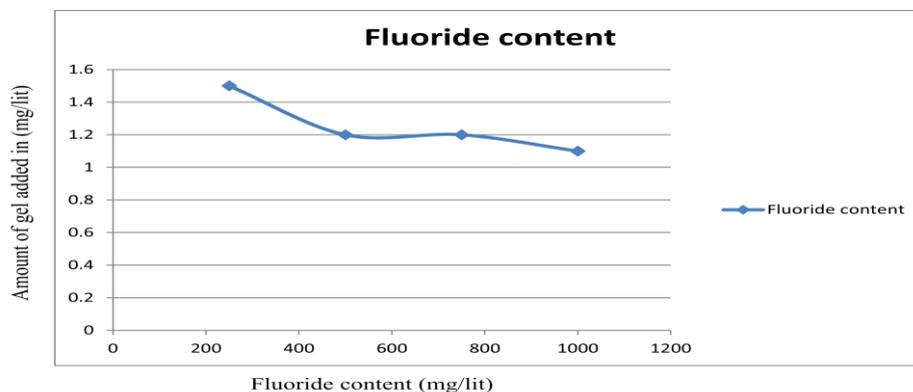
The fluoride concentration after treating with tamarind gel in the water sample decreased from 5mg/l to 1mg/l. Fluoride content is reduced but Tamarindus Indica cannot be directly used because acidity of the water increased. This study was an experimental trial to assess the efficacy of tamarind gel in reducing fluoride concentration in drinking water. The result of the study showed that tamarind gel can effectively remove fluoride from water.



**Figure 3 - Pre treatment**  
**Fluoride content – 1.5 mg/l**



**Figure 4 - Post treatment**  
**Fluoride content – 1.1 mg/l**



**Figure 5 - Fluoride Reference Scale**

#### IV. CONCLUSION

From the conclusion of the study, the natural and acid treated tamarind cover aqueous solution can be used for fluoride extraction of water as it has the properties to effectively remove dissolved fluoride ions in the drinking water. At pH 6.0 maximum fluoride uptake is observed. Percentage removal of fluoride ions had a direct impact on increase in amount of bio sorbent. Naturally available tamarind husk is a by-product of many food processing and food industry industries, so it can be used as a very inexpensive and efficient agent for the fluoridation process. The technique developed and used in the present study is very simple and inexpensive. Further study shows the production rate, rate of degradation and efficient use of tamarind card, effect of adsorbent level, effect of particle size on fluoride submission, effect of temperature on defluoridation.

#### V. REFERENCES

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