

GOVT. DEGREE COLLEGE, TANDUR
DEPARTMENT OF CHEMISTRY
STUDENT STUDY PROJECT (JIGNASA 2020-2021)

COMPARATIVE STUDY ON REMOVAL OF FLUORIDE FROM GROUND WATER BY COST
EFFECTIVE ADSORBENTS

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DECLARATION

We are here by declare that the work presented in this study project entitled “comparative study on Removal of Fluoride from Ground Water by cost effective Adsorbents” is an original and has been carried out by us in the Department of Chemistry, Govt Degree college Tandur and has not been submitted either in part or in full for the award of any Degree of any University earlier.

INTRODUCTION

❖ STATEMENT OF THE PROBLEM

- ❖ Fluoride is the major inorganic pollutant of natural origin found in ground water.
- ❖ Fluoride in minute quantity is an essential component for normal mineralization of bones and formation of dental enamel.
- ❖ The safe limit of fluoride in drinking water is 1 mg /lit.

- ❖ Fluoride beyond desirable amounts (0.6-1.5 mg/l) in ground water is a major problem in many parts of world.
- ❖ Many conventional methods available which of them removed excess of fluoride from water.
- ❖ They are generally ion exchange methods, precipitation methods and adsorption methods.
- ❖ But most of these methods have high operational, Maintenance cost. Low fluoride removal capacity, lack of selectivity for fluoride, generation of large volume of sludge

❖ With this in perspective current work was taken to explore feasibility of fluoride adsorption from aqueous solutions with cost effective cheap adsorbents.

Table 1: Percentage Removal of fluoride with different Adsorbents

S.no	Adsorbents	Initial Concentration of fluoride in mg/L	Final Concentration of fluoride in mg/L	Amount Adsorbed	% Removal
1	Red mud	10	2.9	7.1	71%
2	Orange Peel Powder	10	2.1	7.9	79%
3	Horse gram seed powder	10	2.5	7.5	75%
4	Chalk powder	10	1.4	8.6	86%
5	Multanimitti	10	4.4	5.6	56%

AIMS AND OBJECTIVES

- ❖ Taking severity of the problem into consideration, the present study is carried out to know the adsorption capacities of effective, cheap and naturally occurring, synthetic biomass materials like chalk powder, horse gram seeds powder, orange peel powder, red soil and multanimatti.
- ❖ So a considerable attention has been devoted to develop the better and suitable adsorbents for defluoridisation purpose,

REVIEW OF LITERATURE

- ❖ A variety of methods for fluoride removal are known.
- ❖ They involve precipitation and adsorption methods.
- ❖ Precipitation methods involve in addition of chemicals and formation of fluoride precipitate or co-precipitate.
- ❖ The chemicals included lime magnesium compounds and aluminum sulphates.

- ❖ Vekatraman reported “ avaram” bark based cation exchange resins for fluoride removal .
- ❖ Active carbon prepared from coffee powder, rice husk, coconut shell , used tea powder, dried amla bark, saw dust and their sulphonated compounds with alums have also been so far used.
- ❖ Freshly fired brick pieces are used for the removal of fluoride.
- ❖ It is reported that the efficiency depends on the quality of freshly burnt bricks .
- ❖ The use of bone charcoal is reported to be an effective means for the reduction of fluoride, but it is found to be pH dependent.

RESEARCH METHODOLOGY

❖ In this paper an attempt has been made to suggest certain low cost materials as effective adsorbents of fluoride.

❖ The adsorbents primarily screened were multanimatti, red mud, horse gram powder, chalk powder, and orange peel powder.

❖ Initially all the adsorbents are screened by adding 1 gm of each of adsorbent to 100 ml of stock solution of fluoride.

❖ Batch adsorption experiments are carried at room temperature by varying contact times.

❖ The initial and final concentration of fluoride in different test solutions were determined by spectrophotometer and percentage removal of fluoride was determined which were produced below.





Fluorosis

Adsorption

Water under permissible
Fluoride limit

Healthy Teeth and
Gums



RESULTS AND DISCUSSION

- ❖ The adsorbents selected for the present study are chalk powder, horse gram seed powder, orange peel powder, red mud, and multanimatti.
- ❖ From the values obtained from the experiment is observed that the order of adsorption is in chalk powder > orange peel powder > horse gram seed powder > red mud > multanimatti.
- ❖ The adsorption capacity is more at lower concentration compared to higher

- ❖ In the current study it is observed that the physical adsorption by these natural adsorbents leads to the cheap , on toxic easily and locally available materials.
- ❖ The parameter like contact time of adsorbent with the fluoride sample solution was also investigated .
- ❖ It is found that removal of fluoride ions increase in contact time at initial stages of addition.
- ❖ It is noticed that typically 70-80% of the fluoride adsorption occurs within the initial hours of the contact time of adsorbents

CONCLUSIONS AND SUGGESTIONS

- ❖ This paper provides an overview of various low cost adsorbents used for the effective removal of fluoride from water.
- ❖ Most of the adsorbents performance depends on contact time.
- ❖ The removal capacity increases by increasing contact time to certain extent.
- ❖ The other untreated adsorbents are also available and hope that it will encourage even more rapid and extensive developments for the treatment of fluoride in drinking water.

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