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Fluoride Distribution, Health Risk And Adsorbent Remediation Study Of Ground Water Of District Jalaun Up

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Abstract: Adsorption Remediation Study Of Ground Water Of District Jalaun
1- COLLECTION OF WATER SAMPLES- This chapter describes the methods of sample collection and analytical procedure adopted for analysis of water samples of Rural areas around Jalaun District (U.P.), India.

To examine the impact of contaminants on groundwater of Jalaun District, total 60 water samples were collected from selected sampling sites rural areas of Jalaun, in rainy, winter and summer seasons during the year of 2021-2022.

This study was aimed to investigate the seasonal variation on water quality parameters and effect of fluoride on quality of water and human health. An effort also made to reduce fluoride concentration by using low cost bio adsorbent. All the experiments were analysed in research laboratory.

Key Words: Love, relationship, lust, society, feminism, struggle, freedom, money, maintained, justifiable.

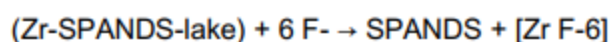
2- SAMPLING METHODS- To analyse fluoride distribution in ground water of District Jalaun (U.P.) samples were collected from hand pump, bore well from rural areas of Jalaun District, U.P. To collect the sample good quality narrow mouth souw-capped bottles of and two litter capacity were used. There bottles were first washed with diluted nitric acid than three times washed with DM (Demineralised) water. The bottles were rinsed thrice with the water to be sampled before collecting the samples.

3- SAMPLING SITES- Samples were collected from 15 villages around Jalaun District. Total 180 (60 in each season) samples were collected from selected sampling sites in rainy, winter and summer seasons. So that actual fluoride Distribution in ground quality of this area can be examined.

Labeling of Samples- The sampling bottles were filled leaving no air space, and then the bottle was sealed to prevent any leakage. Each sampling bottle was clearly marked with the sampling code, name and address of the sampling station, sample description and date of sampling.

Method's Of Analysis Of Distribution Of Fluoride In Given Water Sample-

PRINCIPLE- Under acidic condition fluoride ions (F⁻) reacts with zirconium-SPANDS- dye- lake and dissociating a portion of it into a colourless complex anion, hexafluorozincate (ZrF₆⁻) and the dye. As the amount of fluoride increases, the colour produced becomes progressively lighter and hence it obeys Beer's law in a reverse manner. The chemical reaction involved in the method is given below:



(Red bleached dyes)

Procedure- The fluoride ions in water samples were determined by SPANDS method. Firstly, 400 ml distilled water was taken in distillation flask. Then 200 ml con. H₂SO₄ and a few glass beads were added with operating magnetic stirrer. Then apparatus was heated at 180°C. When temperature was reached at 178°C, then distillate was discarded.

This acidic mixture was cooled to 80°C, remaining in the flask and added 300 ml water samples. The distill water was stirred with magnetic stirrer until the temperature was reached at 180°C. Then heating was stopped and retained the distillate for analysis.

Then, added Ag₂SO₄ to the distillation flask at the rate of 5mg to avoid Cl⁻ interference. Then the H₂SO₄ solution in the flask used repeatedly until the contaminant from the samples accumulates to such an extent that



recovery was affected. The temperature was noted down.

St. Fluoride, solution, mL.	0.0	0.1	0.2	0.5	0.4	0.5	1.0	2.0	3.0	5.0
µg F	0.1	1.0	2.0	5.0	10.0	20.0	30.0	50.0	70.0	90.0

Different Standard Solution of Fluoride Concentration- Then 10.00 ml of mixed acid-zirconyl-SPADNS reagent was pipette out and added into each standard and mixed properly to avoid contamination. The spectrophotometer was adjusted to zero with reference solution and obtained the absorbance readings of standards (at 570 nm).

Then, the graph was plotted between mg F- with absorbance. 50 ml of sample was diluted to same portion of distilled water (50 ml) for the colour development. Then, adjusted the sample temperature to that of the standard curve. Then added 10.00 ml acid-zirconyl-SPADNS reagent and mixed properly and read the absorbance reading with the help of UV- Visible spectrophotometer (UV 2300).

Calculation- The concentration of fluoride can be measured by using this formula-

$$F \text{ (mg/L)} = \frac{A}{B} \times \frac{1}{R}$$

A = µg F-

reading from the standard curve.

B = volume (mL) of diluted sample taken for colour development.

R = when sample is diluted, final volume (ml) of sample taken for dilution.

List of Sampling Stations of Study Area with their Natural Sources

S. No.	Location in study area	Sample No			Nature of sources
		S.S	W.S	R.S	
1	Chamed	4	4	4	HP
2	Amkhesda	4	4	4	HP
3	Byona	4	4	4	HP&BW
4	Gadhela	4	4	4	HP&BW
5	Malcoopara	4	4	4	BW
6	Konch	4	4	4	HP&BW
7	Toomra	4	4	4	HP & BW
8	Kailiya	4	4	4	BW
9	Aata	4	4	4	BW
10	Anda	4	4	4	HP
11	Gaduva	4	4	4	HP & BW
12	Kamsera	4	4	4	HP
13	Madhavgad	4	4	4	HP
14	Gohan	4	4	4	HP & BW
15	Teetra	4	4	4	HP
	Total	60	60	60	

Method of Analysis of Defluoridation water sample (Adsorbent Remediation study)- There was a number of experiments have been carried out through out world for defluoridation using various materials. Fluoride can be removed by adsorption onto many adsorbent materials. In present research work Tulsi (*Ocimum Sanctum*), Activated charcoal and *Azadirachta indica* (NEEM) Have been used as adsorbent for defluoridation of water.

1. Preparation of *Ocimum Sanctum* Leaf Powder To prepare *Ocimum Sanctum* leaf powder, leaves were collected from local Tree. Leaves were collected having length between 1-2 cm. and width is 1 cm. The OS leaves are cleaned and then dried at 60 C in an air circulated oven. Grinding the leaves into a fine powder. By using domestic Blender, Untill the size of Adsorbent become sieve out through 500 µm. and sieved through 500 µm. stainless steel sieve.



Treatment of Ocimum Sanctum leaf Powder- To treat about 40 g. of OS leaf powder was added to 400 ml. of 1N HNO₃ for acid treatment and 0.5 N NaOH for alkali treatment. The mixture was boiled for about 20 min. washing of the powder sample was carried out by using distilled water until maximum color was removed and clear water was obtained. Finally, it was dried again in an oven at 50°C for 6 hrs.

The nitric acid (1N HNO₃) was used for acid washing of adsorbent. The sodium hydroxide (0.5 N NaOH) was used for alkali washing of adsorbent. For fluoride detection spectrophotometer was used.

Removal of Fluoride by OS leaves Powders- To study the removal of fluoride in water samples 50 ml water sample was taken than 1g OS leaves powder (treated) was added. The sample was filtered by using Whatmann's filter paper no. 42 for further uses. In this filtrate, 10 ml of each SPADNS and zirconyl acid solution was added. The sample was checked for fluoride detection by spectrophotometer at wavelength 570nm. Absorbance readings were compared with standard curve and the removal efficiency was found. 02. Removal of Fluoride by Activated Charcoal Procedure Removal of fluoride from water sample, 50 ml of water sample was taken then 1g of Activated charcoal adsorbent was added in a conical flask. After shaking in a shaker, a sample was taken from each conical flask. The mixture was filtered using a Whatman No.42 filter paper and the filtrate containing the fluoride was analysed by UV visible spectrophotometer at a wavelength of 570nm. Prior to this, a calibration curve was prepared and used for determining the fluoride concentrations. Activated carbon is defined as a carbonaceous material with a large internal surface area which allow it to adsorbed materials from a liquid or gas phase.

03. NEEM LEAVES AS A ADSORBENT MATERIAL : Azadirachta Indica, commonly known as Neem. This tree belong to Family Meliaceae. It is Typically grown in Tropical and Semi Tropical Regions. Its fruits and Seeds are the source of Neem Oil. A.I. alos be used for water purification and is some time used in Herbal Medicine. It is a fast growing, draught Resistant tree, native to southern foot hills of the Himalayas Tree in North western Indian and Widly cultiated in Tropical and Subtropical Areas.

The present invention Relates to a Azadirachta Indica, That can act as effective coagulant in the treatment and purification of polluted water. Especially, it relate to a process for preparation of coagulant protein particularly from leaves powder of the Tree of A3 India. It has been found out that leaves of Azadirachta Indica contains certain chemical which make them better absorbent Substance.

PREPARATION OF AZADIRACHTA INDICA LEAVES POWDER -

- * To Prepare A i. leaves powder, leaves of A.I. were collected from local trees.
- * Leaves were collected having length between 05 to 06 cm. each.
- * Leaves are cleaned and then dried at 60 0C in an air circulated oven.
- * Now grinding the leaves into a fine powder using a domestic blender.
- * Then sieving the ground powder through sieve.

TREATMENT OF LEAVES POWDER OF AZADIRACHTA INDICA-

- * Neem leaves powder washed to Remove moisture and tree from Acid and kept in dryer for 20 to 25 minute.
- * After drying, powder was mixed with H₃PO₄ in Silica crucible and kept in furnace at 2600 for 15-20 minute.
- * The Heating period depends upon Atmospheric temperature then solution was cooled and repeatedly washed using Hot water to Remove tree acid and moisture.
- * Total 06 or 07 washing takne and kept it in dryer for 20 to 25 minute and prepare Black coloured Adsorbent kept in bottle.

REMOVAL OF FLUORIDE BY ADOORBENT MATERIAL-

- * The Sample are taken and put in dryer for about 30 minute, After the sample is dried, the sample is weighed as 1 g, 2 g, 3 g., 4 g., and 5 g.
- * The weighed samples are put in the conical flask of 250 ml. The prepared solution of Adsorbent solution is



poured in the Flask.

- * After the Addition of solution, the flask is well shaken for 10 minute and allowed to stand still for 48 hours.
- * After 48 hours the sample is shaken and filtered, the filtered sample is collected in plastic bottles and the activated carbon is collected sample kept in dryer. After drying the samples are packed and colorimeter reading taken of all filtered solution.

HEALTH RISK DUE TO FLUORIDATION IN GROUND WATER- The presence of fluorite (F-) in excess quantity is a serious matter of concern from public health point of view. The threat of fluorosis has been rapidly increasing and the disease is still sustained as an unsolved health problem in our country. In India 17 states have ground water with fluoride concentration more than 1.5 mg/L. In U.P. about 32 District out of 75 District are suffering from high fluoride concentration (1.5 Mg/L) in Ground water. Survey Based study was aimed to assess the fluoride concentration in ground water in the rural areas of Distt. Jalaun, Where ground water is the main source of drinking water. A total 180 samples were randomly collected from 15 Rural sites of Distt. Jalaun U.P. and also these places are taken into consideration. Survey based study method for evaluating health risk problem due to fluoridation in Ground water-

1. Name of Place of Survey site -
2. Total population According to Government record -
3. Distribution of people according to Gender -
Male - Female -
4. Distribution of people according to Age Group -
Child Group Youth Group Old Group
(00 to 10 year) (11 to 45 year) (45 and its above)
5. Peoples who are suffering from disorder caused by fluoridation in Ground water.
Male Female, Child, Youth, Old
6. Name of Patient and Disorder-
7. Any Government / Local NGO Help
8. Any suggestion

Above Given Questionnaire have been done for survey based study method for evaluating the Health Risk problem due to Fluoridation in Ground Water in District (Jalaun) On The Basis of Survey Based study, a conclusion have been drawn which make the objective evaluation clear. On the Basis of Conclusion, several graph and tables have been done.

SUMMARY AND CONCLUSION- Keeping in view the following aspect the present work "Fluoride Distribution, Health risk and Adsorbent remediation study of Ground water Distt. Jalaun U.P." was conducted. The study area (Jalaun) belongs to hot semi-arid climate. semi-arid region, rainfall is meager and the amount of rainfall is limited to a few month monsoon only.

The present study deals with the systematic investigation of Fluoride Distribution, Health Risk, and adsorbent remediation study of (Ground water of Distt. Jalaun) it was concluded that water quality of Jalaun district is not suitable for drinking purpose (without exception) without water treatment properly. For this groundwater samples from the study area were collected in summer, winter and rainy seasons and analyzed for required.

Water quality parameters like fluoride was found to be beyond the standards limit prescribed by WHO standards. Seasonal and spatial variation of water quality parameters were also studied by graphical analysis.

The presence of Fluoride (F) in excess quantity is a serious matter of concern from public health point of view. The threat of fluorosis has been rapidly increasing and the disease is still sustained as an unsolved health problem in our country.

In India 17 states have groundwater with fluoride concentration more than 1.5 mg/l. In U.P. All 65 districts



are suffering from high fluoride concentration (1.5mg/l, WHO) in ground water. This study was aimed to assess the fluoride concentration in ground water in the rural areas of Jalaun district where ground water is the main source of drinking water. A total 180 samples were randomly collected from 15 rural sites of Jalaun district village.

Analysis of fluoride distribution in the Ground water of District Jalaun) The present study reveals that groundwater of Jalaun district is slightly alkaline in nature due to higher concentration of total alkalinity in most of the samples. Besides other reasons, it is one of the most important factors for the enrichment in fluoride concentration in the Ground water of District Jalaun.

Correlation and regression techniques have been used to obtain the systematic correlation between dependent and independent variables (parameters). In the present study, the distribution of fluoride parameters of Ground water revealed that it was more or less correlated with another parameter. This study revealed that groundwater quality was only affected by the seasonal change in a year, and present findings will stimulate further research in the field of groundwater pollution.

Health risk issue due to excess fluoride concentration in Ground water- Survey Based study revealed that due to drinking of water containing excess of fluoride concentration, most of the disorders like bone effects, dental effects, and cardiovascular effects, people of rural areas of district Jalaun are facing. A survey has been done randomly in all of the sampling sites of district Jalaun, which concludes that a lot of people are facing the above-given disorders, and no any type of help either from local N.G.O or from government side were doing to mitigate such problems. Both gender male and female were suffering from these problems. In age-wise study, it was concluded that children of the age group (5 to 10 years) were rapidly suffering with this problem.

REMOVAL OF FLUORIDE BY LOW COST ADSORBENTS- The water pollutant fluorides are priority pollutants and have also profound effects on human health. Various regulatory bodies have imposed maximum permissible limits of fluoride i.e. 1.5mg/L, among all the methods of water treatment, adsorption is one of the most suitable methods. In this process, low cost adsorbents such as OS leaves powder, AI leaves powder and activated charcoal have been used. Among 03 AC was found to be efficient and economical for the removal of Fluoride from water. The fluoride removal of AC is appreciably high (12.121) as compared to OS (7.891) and AI (8.222). From the adsorption study, it is clear that OS and AI adsorbents have low potential to be efficient defluorinating agents as compared to that of AC. The study area is affected by high concentration of Fluoride.

The population is poor, who can not afford the costly instrument for water purification. For such habitats OS leaves powder and AI leaves powder are most common low cost adsorbents. Which can be demonstrated and household and can reduce the concentration of fluoride of drinking water. These two low cost with the help of most common adsorbent (OS and AI) people can reduce the concentration of Fluoride of Drinking water and thus make their and their relatives life much happy and free from disorder and also make slogan "Healthy India Happy India"

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