HYDRO CHEMICAL INVESTIGATION OF GROUNDWATER QUALITY AND DEFLUORIDATION BY HERBAL METHOD

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Abstract

Hydro chemical investigation of the regions which are affected by concentration of more amount of fluoride content in groundwater is required to be examined. To remove fluoride content present in water by different methods of defluoridation. Here one of the most efficient methods is being implemented, that is herbal method. Which turns to be more economical and easily handled by anybody. Tridox procumben plants are being used for better results. These are locally available and these can be afforded by the village people to implement in the groundwater sources to get potable water for drinking purpose. In the present study water sample is being collected from 5 different places. Based on the experiment carried it is evident that the recommended effective contact time for the activated carbon for fluoride removal is 6 hours. And the time required for filtration process of 1 liter of water is 18 minutes which can remove 35% of fluoride content.

Keywords: Hydro chemical, defluoridation, Tridox procumben plants.

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1. INTRODUCTION

Groundwater is the main source of water for a variety of purposes in most parts of the world. The presence of certain low or high concentrations of specific ions is a major problem as it makes groundwater unsuitable for a variety of purposes. Water below the surface of the earth. It is mainly composed of accelerated surface water. The source of springs and wells is called groundwater.

Fluoride-contaminated groundwater formations suitable for semi-dry or dry sub-wet areas. A formation or formation adjacent to a country that exhibits potential fluoride-rich environmental characteristics, is within a country known for fluoride problems (according to UNICEF), and has the same fluoride problems across border Region. Groundwater is present in aquifers, porous rocks, water is attracted by soil particles and capillarity, which describes how water travels within a porous medium, shifts water from wet soils to dry lands. Aquifers are found in many locations. Some are located just below the earth's surface, while others are distant to surface of the earth. There may be multiple aquifers within the same area, and even most deserts are above the aquifers.

1.1 Defluoridation

Defluoridation is a remedy used to do away with fluoride from consuming water. The technique of this approach is to do away with fluoride, that's a enormously poisonous chemical, to save you fitness problems and dental problems that includes in humans. It is meant to assist shop the surroundings so human beings can drink secure water. Excess fluoride in groundwater has emerged over the past few days due to the reduced availability of potable groundwater resources. Humans may also live to tell the tale for numerous weeks without food, however slightly some days without water due to the fact a consistent deliver of water is wanted to refill the fluids misplaced thru regular physiological activities. Lack of safe drinking water ok in rivers, streams, wells, wells, and different water bodies. This grassy water includes a myriad of microbial species, a lot of that has now no longer been cultured, much less recognized and is able to inflicting disease. Such sicknesses like typhoid, cholera, hepatitis, etc. Drinking water is typically infected via way of means of numerous pollution inclusive of fluorides, nitrates, iron etc. However, those contaminants have extraordinary poor results on human fitness.

2. MATERIALS AND METHODOLOGY

Water is the main source for this study, It is collected from the north part of Karnataka where the contamination of fluoride content is found to be more, such as Gadag and Bellary located in the north-eastern part of Karnataka where the area is affected by the mining activities. Kolar situated in the southern part of Karnataka and this is also affected by the mining activities and some different soil characteristics. Mysore is situated in the southwestern region of Karnataka wherein the water collected in Mysore region is the extreme border of Kodagu and Mysore district. As referred from the "central groundwater board', it is mentioned that these above-mentioned regions of Karnataka has fluoride content >1.5 mg/l. Water is collected from the bore wells in plastic bottles from different places as mentioned above.

2.1CHEMICAL REAGENTS

Fluoride reagents (SPA Dings) and concentrated sulphuric acid are available in the laboratory for better usage. Collecting the basic materials and knowing the issues regarding them is more important here before implementing.

2.2 INSTRUMENTS REQUIRED

Titration units, thermometer and muffle furnace.

Figure 1: Muffle furnace

2.3 HERBAL METHOD

Where the Tridox procumbent plants are used. Which are having its high medicinal values. And with the capability of attracting carbon ions present in water. Tridox procumben popularly called "coat buttons" shown in Figure 2 in English is an herb that is spreading throughout parts of Nigeria and parts of India as well. It is mainly grown during the rainy season and is a tried and tested medicinal plant for extracting heavy metals from water. Tridox procumben has a large percentage of carbon. Therefore, it causes the formation of activated bio carbon for adsorption.

Figure 2: Tridox procumben plant

Tridox procumben leaf activated bio carbon is used to remove heavy and toxic metals and dyes from drinking water as well as industrial wastewater. Several methods have previously been developed to remove fluoride from water. However, most of them required expensive and complicated equipment that ordinary people at the village level could not afford. Accordingly, an attempt was made to evaluate the herbal dehydration study. No electricity is needed and anyone can operate it easily.

2.4 PREPARATION OF ACTIVATED CARBON

The Tridox procumben is collected from a nearby site, and then separates the stem, roots, and leaves without using flowers. As shown in Figure 2 below. They were carefully washed, cleaned, divided into pieces and then placed in a muffle oven at 440 °C for 120 min using a chemical laboratory evaporator, after complete drying, 25 % by volume concentrated sulfuric acid. Was added and again kept in the oven for 30 min at the same temperature of 440 °C. The resulting product called activated carbon was prepared from the stem of the procumben Tridox plant.

A 100 ml beaker is filled with water sample, 0.15 g of activated carbon prepared from the Tridox procumben plant is added and mixed thoroughly, to settle. At each 3-hour interval, tests were performed 24 hours to determine the effective exposure time of fluoride decomposition with activated carbon. Fluoride testing is done using a colorimeter, a digital device that measures fluoride and other elements in water. Pure water is used in all tests as to whether or not to control the test equipment [20]. Eight 100 ml beakers are sorted and numbered 18. Each sample is filled with a water sample with 0.15g, 0.30g, 0.45g, 0.60g, 0.75g, 0.90g, 1.05g and 1.2g of activated carbon placed in a beaker and carefully blended. They are all authorized to set aside 6 to 6 hours and determine the amount of fluoride per cup. Pipette 10 mg of water sample and add 2 mg of SPADINS (fluorine reagent). In addition, 10 mg of pure water is poured into one sample and 2 mg of SPADINS (fluorine reagent) is also added. The two sample cells are well stirred to produce a mixture of the water sample and the fluoride reagent. First, a sample of the so-called pure water cell is placed in a colorimeter to the zero of the tool, and then a sample of the water containing the sample water is placed to test the fluoride concentration.

Figure 3: Basic preparation of Tridox plants for activated carbon.

These are used to get the carbon residue and the experiment is carried out by using water filters. Activated carbon prepared is inserted in the water filters to know the better results. And are compared with the Indian standards. After the filtration process is done.

3. METHODOLOGY

3.1 FLUORIDE TEST

Measure four ml of water pattern using a measuring cylinder. Keep the measuring cylinder in place of the eyes to avoid parallax error. Transfer this 4ml to a test-tube. Add 15 drops of fluoride reagent to a test tube with a water pattern. Serve the test-tube and stir it slightly so that the reagent mixes evenly with the water pattern. You will notice the extrude inside the water pattern color. Compare the color of the water pattern with the colors on the chart and inside the kit. Against the water pattern information (date/time/location) make a notice of the stage of fluoride cited towards the nearest color at the chart. Empty the contents of the test-tube in the sink and wash the test-tube, cork and measuring cylinder thoroughly.

3.2 FILTRATION SETUP

Take 2 liters plastic water bottle and cut the bottom of the bottle using a cutter.
And also prepare a jar fitted with a simple tap.

Place the paper towel roll inside the bottle as first layer, making sure that the cap of the water bottle is done with the small hole of 3 to 4 mm.

Add 100g of activated carbon prepared from plants as second layer and spread it partially and again add the paper towel above the activated carbon.

Then add small sized sand grains as fourth layer above which place 10 to 20mm size gravel/ coarse aggregate.

As fifth layer place the coconut coir above the gravel and finish it by using 20mm gravel as the top layer of the filtration process. which is shown in the figure 3 below.

Pour 500ml of water into the filtration setup and note down the time taken for the filtration process. The water collected after the filtration process is used for the various drinking water quality tests

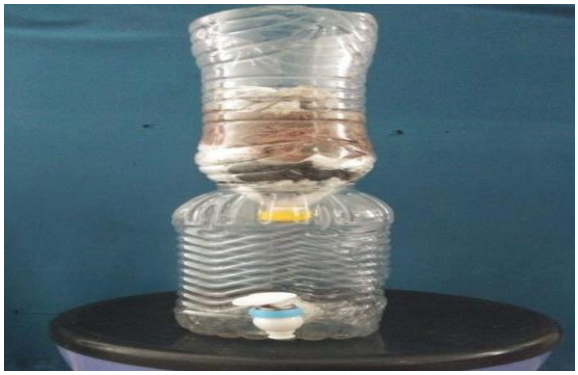

Figure 4: Filtration setup

4. RESULT AND DISCUSSION

Table 1 represents Fluoride content before and after filtration. The water sample collected from different locations were tested for Fluoride content before and after passing through filter media to know the amount of fluoride that can be removed and effective contact time required .Maximum fluoride was removed from sample 2 that is about 35% and after filtration all the sample contains fluoride within permissible limit that is 1.5mg/L.

Table 1: Fluoride content before and after filtration

Sample	Flouride content before filtration (mg/L)	Flouride content After filtration(mg/L)
Sample 1	0.9	0.6
Sample 2	1.7	1.1
Sample 3	1.7	1.4
Sample 4	0.7	0.6

5. CONCLUSION

1. Based at the effects of those studies, it is able to be concluded that with the aid of using natural approach the use of Tridox procumben are powerful in elimination of fluoride from the water.
2. It additionally confirms that the effects received are indicated to be the feasible techniques of elimination of fluoride from water content.
3. The activated carbon organized from Tridox procumben possesses the potential to filter huge amount of fluoride from the water after the filtration manner that is about 35%.
4. Based on the experiment carried it is evident that the recommended effective contact time for the fluoride removal is 6 hours. And the time required for filtration process of 1 liter of water is 18 minutes.
5. Known to be one of the simplest and most inexpensive techniques to be observed for higher effects concerning defluoridation manner.

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