ANALYSIS AND PURIFICATION OF GROUND WATER IN GNANAMANI EDUCATIONAL INSTITUTION BY TRADITIONAL TREATMENT METHOD

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ABSTRACT

In this ground water is filtered by using a natural beds of traditional materials using gravel, sand, charcoal, vetiver, cotton, guava tree wood. Each material are layer as a bed level one over other is order in tank1.Filtered tank1 water is collected in tank2. In tank 2 immersing a guava tree wood for 12 hrs. The various test will be conducted before and after filtration. Fluorides, chlorides, p^H, sulphate, BOD, COD, turbidity and hardness tests are taken. Sample of water is collected from Gnanamani College of Technology ground water.

1. INTRODUCTION

1.1 OBJECTIVE

- Water purification or filtration removes desirable chemicals, physics, contaminants, and suspended solid from the raw water to make water safe for drinking.
- In short, water purification ensures that the water you drink is free of contaminants and fit for consumption.
- The water supplied to our homes come from various sources and is not fit for consumption.
- Without proper purification, you may be susceptible to harmful water home diseases.
- Purification processes such as filtration sedimentation and distillation help in purifying raw water to make it fit for consumption.

1.2 SCOPE OF OUR PROJECT

- Scope of study is to purify the water by small scale water purification or household water purification and storage.
- It may be replacement to contemporary or commercial household water purifier.
- It can be extend to all residential, public buildings, schools, colleges, hospitals, etc.

2. MATERIALS USED

2.1 PEBBLES

Pebbles are used in various water treatment and filtration application . natural pebbles can be provided in various sizes as per requirement.Water filter pebbles is composed of sub-angular ,hard, durable, and dense grains of predominately siliceous material. Extracted from a clean glacial deposit, ACURO's pebble's physical properties make it among the finest available in the world for water filtration applications.

TABLE2.1 PHYSICAL PROPERTIES

Washed Graded Water Filter Gravel/Support Pebble	
Color:	Yellow/Brown
Hardness:	7-8 on MOH scale
Bulk Density:	1680 kgs per cubic meters
Specific Gravity:	2.65
Sizes	US MESH 30/80, 16/ 32, 8/16, 4/8 1/2 "-3/4", 1 "-1 1/2", 2 "-2 1/2"

2.2 RIVER SAND

The same principle, applied in combination with natural sand, used to be the preferred method to filter drinking water. In the filter, called a slow sand filter, water first passes through about 36 inches of sand, then through a layer of gravel, and finally exists the system via an under drain. Schmutzdecke, similar to that in our water feature, forms on top of the sand. The sand removes particles from the water through adsorption and straining, and the Schmutzdecke takes care of most of the other nasty things in the water. Whatever nasties aren't captured are finished off by disinfectants such as chlorine and ozone

2.3 CHARCOAL

Activated charcoal can add important minerals, such as calcium, magnesium and iron back into your water to improve the water quality… charcoal filters not only adsorb these nasty tasting chemicals, but they are also highly effective at removing odors as well, making your drinking water much more palatable

2.4VETIVER

Vetiver is usages have been widely reported in many research. The vetiver is used in water to improve its quality and necessary to have the water required standard. The water used must be safe and free from dangerous bacteria. The mainly used in water filter to vetiver is good filter material. The research conducted to understand the role of the extraordinary physiological and morphological attributes of vetiver grass in soil and water conservation ,discovered that vetiver grass also possesses some unique characteristics suitable for environmental protection purposes (Truong, 2000b).Extensive research in Australia, China and Thailand has established vetiver tolerate to elevated and sometimes toxic levels of salinity, acidity, alkalinity, sod city as well a whole range of heavy metals and agrochemicals.

2.5 COTTON CLOTH

The cloth filter is a cost effective and appropriate method for reducing contamination of drinking water. It is easy to maintain and can be used anywhere. In expensive cotton cloth or sari cloth, folded four to eight times ,provides a filter of approximately 20 micrometer mesh size. This is small enough to remove all zoo-plankton, most phytoplankton, and all v. cholera (the germs responsible for cholera) attached to plankton and particulate matter larger than 20 micrometers. When no other option is available, the cloth filter is "better than nothing". Once the water has been filtered, it still needs to be disinfected

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2.6 DRUMSTICK SEED

Moringa water purification in many parties of the world river water which can be highly turbid is used for drinking purposes. Crushed moringa seeds clarify and purify water to suit domestic use and lower the bacterial concentration in the water making it safe for drinking.

2.7 GUAVA TREE WOOD

The common guava, yellow guava, or lemon guava is an evergreen shrub or small tree native to the Caribbean, Central America and South America. It is easily pollinated by insects; in culture, mainly by the common honey bee, Apis mellifera.Being packed with antioxidants, antibacterial and anti- inflammatory agents and beneficial tannins, fresh guava leaves are considered as a natural pain reliever

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2.8 PREPARATION OF FILTER BED

Tank-I

Preparation of bed layer material is charcoal, vetiver, sand, gravel, cotton cloth, guava tree and drumstick seed. It will separate of bed layer. The height of the tank-I is 42.5m. It will separate 5 layer of bed and each bed layer distance is 8.5m.

Layer-1

The first layer of tank is charcoal. The charcoal is filled with bottom of the tank layer is 8.5m. Active charcoal filters are most effective at reaming chlorine, particles such as sediment, volatile organic compounds (VOCS), and tarte and order form water.

Layer-2

The second layer of tank is vetiver. The vetiver is filter with bottom of the Second tank layer is 8.5m. Vetiver is used to filtration of to kill most dangerous Bacteria and improve water quality and standard. It is natural and good for health.

Layer-3

The third layer of tank is sand. The sand is filter with bottom of the third Layer tank is 8.5m. It also will dangerous bacteria. It will filter the moisture Content and dust. It is a good filter.

Layer-4

The four layer of tank is gravel. The gravel is filter with bottom of the Fourth layer tank is 8.5m water filter pebbles is composed of sub-angular, hand, Durable and dence grains of predominately siliceous material.

Layer-5

The fifth layer of tank is drumstick seed and guava tree .The drumstick Seed and guava tree is filled with bottom of the fifth layer tank is 8.5m. Crusned Drumstick seeds classify and purify water to suit domestic use and lower the bacterial concentration in the water making. It safe for drinking drumstick seed powder can be used as a drink and simple method for cleaning dirty water.

Cotton Layer

The cotton cloth filter is cost effective and appropriate method for reducing contamination of drinking water.

Tank-II

The water purification of tank I water is separated from tank 2.Then it is added for guava tree wood, and drumstick seed in duration of 24 hours' time.

TABLE 2.2 COMPARISION OF BEFORE ND AFTER FILTRATION

Lab tests	Raw water parameters	Treated water parameters	Normal range
Turbidity	0.2 NTU	0.27 NTU	Not exceed 1 NTU
P^h value	6.5	7.14	6.52 to 8.5
Total hardness EDTA	1379.2 ppm	147.5ppm	–
Chloride	1000 mg/l	780 mg/l	250 mg/l
Fluoride	0.97 mg/l	1.75 mg/l	4 mg/l
Sulphate	585.22mg/l	144.56 mg/l	250mg/l
COD	460mg/l	400mg/l	250 mg/l
BOD	0.032 mg/l	0.015 mg/l	2 to 8 mg/l

3 LABORATORY TESTS

3.1 TURBIDITY

Procedure

Thoroughly shake the sample. Wait for disappearances of air bubbles take turbidity feed. Water (blank), turbidity standard (100 NTU/400 NTU) and the sample (or diluted sample) and pour them into three different turbidity meter tubes. Ensure that no bubbles stick on to the tubes. Set the blank for "0" value. Set the blank for "100 NTU" value .Measure the turbidity value of the sample.

Result

The turbidity of the given sample of water is **2.7 NTU**

3.2 pH value

Procedure

Take distilled water, 7.0 pH buffer and 9.2 pH buffer 50 ml beakers. Mark the beakers. Dip the pH electrode in distilled water ,bolt dry, then dip in 7.00 pH. Adjust the mater knob to read 7.00 pH. Dip in distilled water, bolt dry, then dip in 9.2 pH and note the reading . If the reading is 9.2 +/- 0.1 the matter is functioning alright . Otherwise it may require necessary slope adjustment. For slope adjustment, follow the procedure in the instruction manual supplied with the matter. Now take each sample in two beakers and mark them NA and NB where n is the sample number .Dip the electrode alternatively in NA and NB of successive samples every time keeps it dipped in NA for 1 minute . Keep the electrode in the sample (NB) till the reading gets stabilized . Record the pH value of the sample (Dipping in "NA" is for risking the electrode).

Result

The P^H value of the given water sample is **7.14**

3.3 TOTAL HARDNESS

TABLE 3.1 TOTAL HARDNESS VALUE

S.NO	Volume of water sample	Burette reading (Initial)	Burette reading (final)	Volume of EDTA (ml)	Concordant value (ml)
1.	20	0	5.9	5.9	5.9
2.	20	0	5.9	5.9	5.9

Result

The hardness present in the water sample = 147.5 ppm.

3.4. CHLORIDE

TABLE3.2 CHLORIDE VALUE

S.NO	Volume of sample water	Burette reading Initial(ml)	Burette reading Final(ml)	Concordant value (ml)
1	20	0	42	42
2	20	0	42	42

Result

The amount of chloride in the given sample of water=1680mg/l.

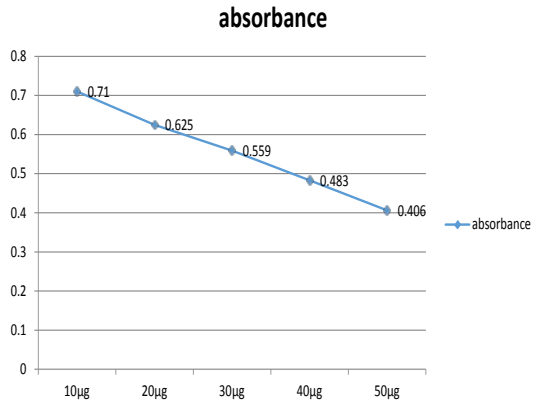
3.5. FLUORIDE (ZIRCONYL – ALIZARIN METHOD)

TABLE 3.3 FLUORIDE VALUE

S.NO	SAMPLE mg/ml	Absorbance value
1	10	0.71
2	20	0.625
3	30	0.559
4	40	0.483
5	50	0.406

Result

The amount of fluoride in the given sample of water=**1.75 mg/l**



3.6 SULPHATE

Procedure

i. Use distilled water for '0' setting of Nephelometer.

ii. Use 100 NTU standard (Used in turbidity test) for '100' setting of Nephelometer.

iii. Take 50ml. Sample in a 100ml measuring cylinder with Penny head. Add 10ml buffer solution. Add 0.5g, $BaCl_2$ mix well for 1 minute after 5±0.5 minutes measure NTU.

Result

The amount of sulphate present in the given water sample is 144.56 mg/l

3.7CHEMICAL OXYGEN DEMAND

TABLE3.4 CHEMICAL OXYGEN DEMAND

S.NO	Sample	Volume of sample (ml)	Burette reading(ml) Initial	Burette reading (ml) Final	Volume of 0.1N FAS (ml)
1	20	20	0	8.5	8.5
2	20	20	0	8.5	8.5

TABLE3.5 CHEMICAL OXYGEN DEMAND

S.No	Sample	Volume of sample (ml)	Burette reading Initial(ml)	Burette reading Final (ml)	Volume of 0.1 N FAS (ml)
1	20	20	0	12.5	12.5
2	20	20	0	12.5	12.5

Result

COD of a sample well water = 400mg/l.

3.8 BIOLOGICAL OXYGEN DEMAND

TABLE3.6 BIOLOGICAL OXYGEN DEMAND

S.NO	Sample	Volume of sample (ml)	Burette reading (Initial) ml	Burette reading (Final) ml	Volume
1	20	20	0	12.5	12.5
2	20	20	0	12.5	12.5

Result

Amount of Biological Oxygen Demand (BOD) = 0.015 mg/l.

4CONCLUSIONS

We tested ground water by using natural filter beds, and the normal range of parameters such as BOD, COD, Hardness, Turbidity, $P^{H,}$ Sulphate, Chloride, and Fluoride is compared for raw water and treated water. pH, hardness and COD is improved compared to the raw water. It is very easy method and we can extended to the public use for treating ground water in traditional method. Because it is good and hygienic. So we can prevent harmful effects from the raw ground water to the water consumers. In this method salt content is not able to remove. My conclusion is to salt water is not suitable to treat in this method.

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