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## ABSTRACT

The present study was done to evaluate the water purifying property of activated Phyllanthus Emblica wood and Coconut Shell. The groundwater sample was collected from Sangli and Ashta. Activated Phyllanthus Emblica and coconut shell were examined as a natural alternative material of ground water treatment. The water sample was tested for 12Hrs, 20Hrs, and 24Hrs respectively. We examined the hardness of the water sample and found that the hardness of water was reduced up to certain percentage. Hence, the hardness was reduced with increased time up to 24Hrs and as the dosage of material was increased.

**KEYWORDS:** Phyllanthus Emblica, Steam activation process, Hardness, Coconut shell.

## 1. INTRODUCTION

Water hardness is the traditional measure of the capacity of water to react with soap, hard water requiring considerably more soap to produce lather. Hard water often produces a noticeable deposit of precipitate (e.g. insoluble metals, soaps or salts) in containers, including "bathtub ring". It is not caused by a single substance but by a variety of dissolved polyvalent metallic ions, predominantly calcium and magnesium cations, although other cations (e.g. aluminium, barium, iron, manganese, strontium and zinc) also contribute. Hardness is most commonly expressed as milligrams of calcium carbonate equivalent per liter. Water containing calcium carbonate at concentrations below 60 mg/l is generally considered as soft; 60–120 mg/l, moderately hard; 120–180 mg/l, hard; and more than 180 mg/l, very hard (McGowan, 2000). Although hardness is caused by cations, it may also be discussed in terms of carbonate (temporary) and non-carbonate (permanent) hardness. The present study was done to evaluate the water purifying property of activated Phyllanthus Emblica wood powder. The groundwater sample was collected from the villages of Ashta and Kupwad. It was analyzed for physiochemical parameters. Hard water minerals such as calcium, magnesium, iron and manganese result in scaling problems and serious failures in pipelines of boilers and heat-transfer equipment. In addition, these divalent ions can react with soap anions decreasing the cleaning efficiency and hence, high consumption of detergents occurred as a result. However, calcium and magnesium are the most common sources of water hardness. Activated Phyllanthus Emblica wood powder was examined as natural alternative material for groundwater treatment in removing hardness. Although many processes are present to remove hardness with lime soda process or ion exchange still we are going to use Phyllanthus Emblica for more efficiency with low cost technique.

## 2. STUDY AREA

The bore water sample collected from two areas of Sangli district.

- Vishrambag, Sangli.
- ADCET Ashta Campus.

## 3. MATERIALS AND METHODS

## 3.1 Material

**3.1.1 Phyllanthus Emblica:** Phyllanthus Emblica wood altered the physiochemical properties of water. Reduction of magnesium level in water may be due to the chelation property of Phyllanthus Emblica wood. Magnesium salts are more soluble than calcium, hence they increase hardness of water and gives unpleasant taste

and it may have laxative effects consumed in higher concentration. It causes renal failure, respiratory depression and cardiac arrest. Thus reduction in magnesium level in this study is another beneficial effect of Phyllanthus Emblica wood.

**3.1.2 Coconut shell:** Coconut shell is an important raw material used to produce charcoal briquette. And coconut shell charcoal have wide applications in many fields because of its features and advantages. Due to its high carbon content and hardness, coconut shells are an excellent raw material source to produce activated carbon. Activated carbon manufactured from coconut shell is considered superior to those obtained from other sources. They typically have a tighter, more microporous pore structure and tend to be harder, more resistant to abrasion and lower in ash than similar grades of coal-based carbons.

### 3.2 Methodology

- The phyllanthus emblica wood and coconut shell was collected. Then this material was dried for 11/2 month.
- After drying of the phyllanthus emblica wood and coconut shell it was cutted into the small pieces of size 1-2 cm.
- The material was washed with distilled water and then dried in oven to remove all the moisture.
- Then to make the carbon the material was kept in the muffle furnace for 2 hours at 600°C.
- This carbon can be activated either by steam activation process or chemical activation process. We have adopted the steam activation process. We made the setup for steam activation as shown in fig.
- once, the material was activated, the tests were taken on the activated material. For different amount of dosage and for different time period.

## 4. RESULTS AND DISCUSSION

Following tests were taken on the sample

1. pH
2. Chloride Content
3. Turbidity
4. Hardness

**Hardness:** Two samples were collected to check the Hardness removal efficiency of the material.

A] Sample 1: Bore water from Sangli

B] Sample 2: Bore water from Ashta

**A] Test on Sample 1:** The Activated carbon of both material (Phyllanthus Emblica and Coconut Shell) were soaked for 20 Hrs. And both kind of Material were used i.e.

(1) Freshly prepared material and

(2) Soaked material for 20Hrs.

The results were as follow

#### Tables:

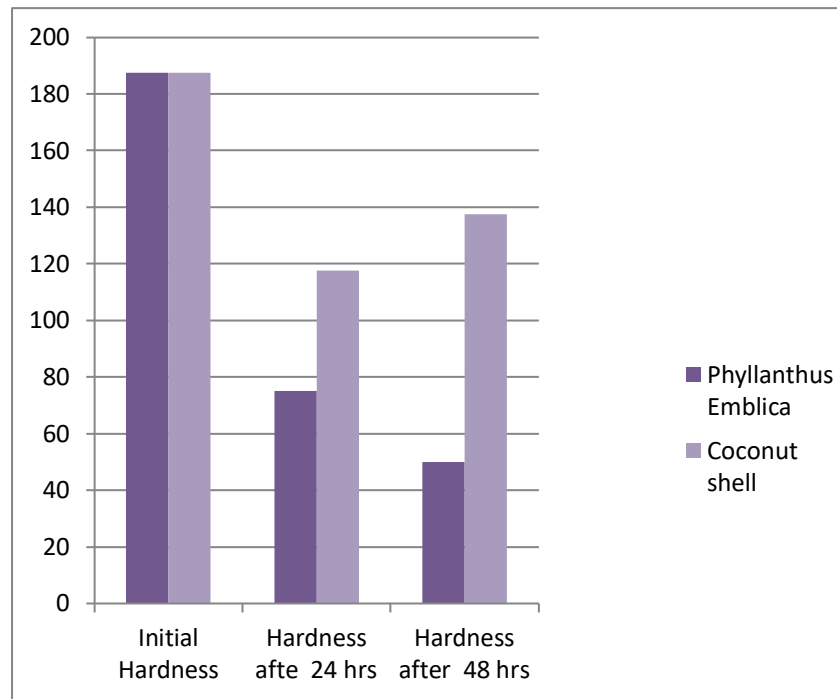
Material	Coconut Shell	Phyllanthus Emblica
Initial Hardness of water sample (ppm)	300 ppm	300ppm
Freshly prepared material soaked for 20Hrs in water sample	190 ppm	220 ppm
Used material soaked for 20Hrs in water sample	202 ppm	230 ppm

#### B] Test on sample 2:

The Activated Carbon of both the materials (Phyllanthus Emblica and Coconut Shell) were soaked for 20Hrs and 48 Hrs. respectively

The results were as follows

Material	Initial Hardness(ppm)	Hardness after 24 Hrs.(ppm)	Hardness after 48 Hrs. (ppm)
Phyllanthus Emblica	187.5	75	50
Coconut Shell	187.5	117.5	137.5



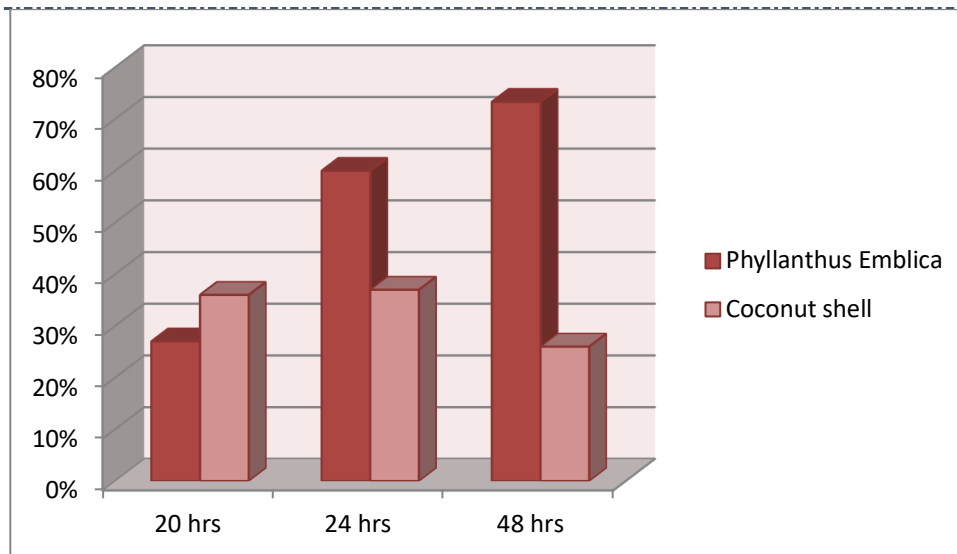
*Test on sample 2 results*

**3Test 3: % Reduction in Hardness**

% Reduction in Hardness after 20Hrs, 24Hrs and 48Hrs respectively for both the materials i.e. Phyllanthus Emblica and Coconut Shell are as follows

Material	20Hrs	24Hrs	48Hrs
Phyllanthus Emblica	27%	60%	73.33%
Coconut Shell	36%	37%	26%





*Comparison of % reduction in hardness*

## 5. CONCLUSION

The present study concluded the various dose of Activated Phyllanthus Emblica Wood and Coconut Shell for the various period of time and we have checked for the hardness removal efficiency for groundwater.

The % reduction in the hardness of ground water was checked for 12, 24 and 48Hrs respectively. It was found that as the time increases the % reduction in hardness increases.

Also the % amount of reduction in hardness increases as the dosage of activated material increases.

Hence it was finally concluded that the use of Activated Phyllanthus Emblica and Coconut Shell as a natural alternative material removes the hardness of water in different percentage for the different conditions.

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