

# WATER PURIFICATION BY HEN FEATHERS AND SELF PREPARED COCONUT SHELL CARBON AND EMBED IN BIOPLASTIC SYSTEM WHICH IS ALSO MADE UP OF HEN RACHIS

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**Abstract**— Water is an essence of life. Due to various civilization activities and industrialization numerous impurities such as biological contaminants, salts, heavy metal ions etc. have been introduced in water. These impurities are harmful for living beings as well as aquatic life. Thus the quality of water is depleting day by day and purification of water is the need of present day. Though there are several methods to purify water, still lacks the cost effectiveness. Thus, here in we conducted a study on purification of water which is aimed to remove both biological as well as suspended impurities at cost effective way by using waste products. Our study deals with the construction of a prototype which works on the principle of adsorption.

**Keywords**— Coconut Shell Activated Carbon, Hen Feathers, Hen rachis, chlorination process, sand granules and Adsorption Phenomenon.

## I. INTRODUCTION

In every 90 second a child dies from water borne disease. This mostly occurs in rural areas. The impurities in water which leads to these diseases are dissolved impurities such as salts like calcium, magnesium, carbonates and bicarbonates which leads to diseases like gall, kidney stone and goiter, and many more impurities like colloidal impurities, micro-organism and suspended impurities. So in order to get rid of these diseases there is necessity to purify water at high purification accuracy, by cost effective and ecofriendly way

This study deals with the construction of a prototype which works on the principle of adsorption. The prototype consists of a plastic straw which is made up of hen rachis. coconut shell activated carbon, hen feathers, sand filters and chlorination process is embed in these bioplastic system for purifying the water. Thus, the complete study is focused from waste to wealth management.

### Vision

Safe and adequate drinking water and access to improved sanitation for all rural areas.

### Goal

- To provide every rural person with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. This basic requirement should meet water quality standards and be readily and conveniently accessible at all times and in all situations.

### Objectives

- \* Enable all rural people to have access to and use safe & adequate drinking water.
- \* Ensure portability, reliability, sustainability, convenience, equality and consumers preference with

regard to lakes, ponds, river, well water and also underground water.

- \* Provide support and environment for Panchayat Raj Institutions and NGOs to manage their own drinking water sources and systems in their villages.

- \* Follow conjoint approach of sanitation and water supply which would progressively lead to Swachh Bharat .

### Materials and Chemicals Required:-

Sodium chlorite, 2 N sodium hydroxide, 2 N conc. HCL, 0.05N sodium sulphide, 30% v/v Hydrogen peroxide, 20% zinc chloride, distilled water.  
Hen Barbs, Hen Rachis, coconut shell .

### Experimental procedure:-

The experiment work divide into three parts:-

- 1.) Preparation and activation of coconut shell carbon
- 2.) Activation of hen feathers
- 3.) Preparation of bioplastic from Hen Rachis.

### 1.) Preparation and activation of coconut shell carbon

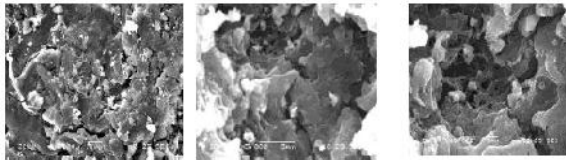


Collected discarded coconut shell from nearest temple

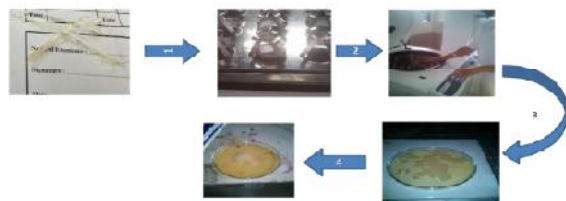
- For increasing the porosity of coconut +shell surface, soaked the material .i.e. approx 20 gm into 120 ml of 20% w/w solution of zinc chloride.
- 2.) Put the soaked material into muffle furnace
- 3.) Then the burnt material was crushed into small beads

- 4.) Wash the small carbon beads with 1:1 HCL solution
- 5.) Then again washed with distilled water
- 6.) For removing access water the small beads carbon was undergone to a buchner funnel process.
- 7.) And then for removing moisture, material was kept in oven at 100 degree Celsius.

**SEM Images of coconut shell carbon**



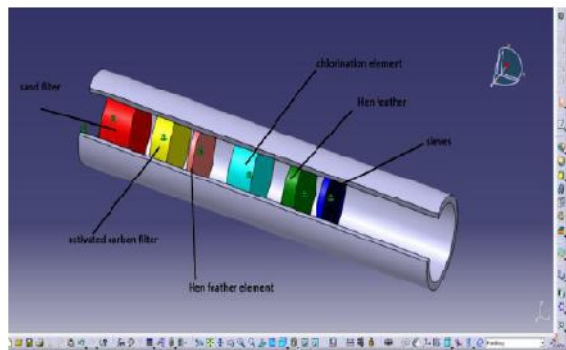
- The solution is then filtered and centrifuge at 18000 rpm for 5 min. step 2.
- The supernatant liquid collected by using filter paper. Then 2N HCL was added to the soln. step 3.
- Pour the precipitate mixture onto a Petri dish and then leave it to dry out at 50degree Celsius for an hour to make the plastic. step 4.



**2.) Activation of Hen Feathers**

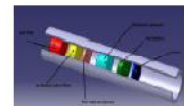
- Collected the Hen Feathers from nearest slaughter shop. As shown in fig 1.
- Washed it with a tap and detergent water.
- For removing blood stains, washed it with a sodium chlorite soln. fig 3.
- Then for remove sticky impurities, Soaked the Hen Feathers in 30%v/v solution of hydrogen peroxide for 24 hrs. fig. 5
- Then again washed it with distilled water.
- For removing excess water, treated hen feathers undergone to a Buchner funnel process. Fig 6.
- Finally kept the Hen Feathers in oven at 100 degree Celsius for removing the moisture.
- Then separate the Hen Barbs and hen rachis separately from treated Hen feathers. Fig.7.

**Prototype:-**



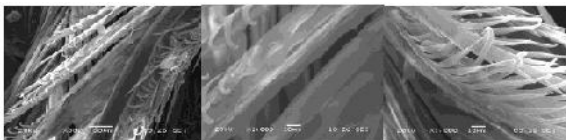
**Advantages:-**

**Water purification system**



- Cost effective and innovative approach of engineering Aspects.
- Capability of trapping the bacteria, viruses, and other contaminants up to 92%.
- Eco-friendly system which has life span greater than 1 month.
- 4
- This system can be applied to larger scale of water purification.
- Method of Regeneration is also very easy & cost effective.

**SEM Of Hen Feathers:-**



**➤ Bioplastic:-**



**3.) Preparation of Bioplastic from Hen Rachis**

- Take treated Hen rachis in bulky amount. Fig 1.
- Add Approx 5 gm of Hen Rachis powder in 100 ml of 0.05N sodium sulphide and 2 N NaOH solution
- Shacked this mixture on magnetic stirrer at 32 degree Celsius for 2 Hrs. step 1.

- Totally ecofriendly.
- High tensile strength.

**Economical.**

- Can be used for purification of water.
- bulk quantity of hen feather (Raw material) can be easily obtained from slaughter house or poultry farms.

**Result:-**

ANALYSIS	BEFORE SAMPLING	AFTER SAMPLING
PH	8.7	7.4
HARDNESS	289 MG/L	62 MG/L
TDS	450 ppm	280 ppm

**Our Future study and future effort:**

- Analysis of BOD, COD, TSS, ECOLI, COLIFORM will be our future study.
- Emphasis on to provide this system to villagers through NGOs.
- We will also doing study on river cleanliness.

**CONCLUSION**

We took the water sample from the river INDRYANI which is flowing at the back side of our collage and we have succeeded in to purify the water at very high accuracy by economical, ecofriendly way.

**REFERENCE**

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