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Study of Removal of Impurities from Water by Activated Charcoal Prepared from Coconut Shell and Hen Feathers Both Embedded in Bio-Plastic Straw Made from Hen Rachis

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ABSTRACT

In every 90sec, a child dies from water borne diseases. Due to vast urbanization and industrialization water bodies are contaminate with huge toxic chemicals, solid wastes, heavy metal ions etc. that vanishes the aquatic life and reduce the water quality day by day for drinking purpose. Purification of water is the need of the present day. Though there are several methods to purify water, still lacks cost effectiveness. Thus, herein we conducted a study on purification of water, which is aim to remove biological, colloidal, and as well as suspended impurities, water-soluble dyes at cost effective and eco-friendly way by using waste products. Our study deals with the construction of a prototype, which works on the principle of adsorption. our main mission and vision are to provide this system to each and every common person which are unable to install RO's or high-cost technology The prototype consists of a bio plastic straw which is made up of hen rachis, hen barbs, water hyacinth, etc. have been introduced in prototype for purification of water. Straw which is made up of hen rachis. Thus, the complete study is focus from waste to wealth management.

Keywords: prototype, Adsorption, Bio plastic, Hen Feathers, Water Hyacinth.

I. INTRODUCTION

Every 90 seconds, 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 goitre, 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 eco-friendly way the textile industry is accountable for using and producing 1.3 million tons of dyes and pigments, most of which are made synthetically. The textile industry is One of the largest sectors globally and produces an astonishing 60 billion kilograms of fabric Annually, using up to 9 trillion gallons of water.10-25percentage of textile dyes are lost during the dyeing process, and 2-20% is discharged as aqueous effluents in different environmental Components. In particular, the discharge of dye-containing effluents into the water environment is undesirable because of their colour, released directly and breakdown products are toxic, carcinogenic or mutagenic to life forms mainly because of carcinogens such as benzidine, naphthalene and other aromatic compounds.

IJARSE
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II. VISION

To provide Safe and adequate drinking water for rural areas.

III. GOALS

To provide every rural person with adequate safe water for drinking, cooking and other domestic by Hen Barbs, Hen Rachis, coconut shell, water Hyacinth**.**

IV. OBJECTIVES

* Follow conjoint approach of sanitation and water supply, which would progressively lead to Swachh Bharat.
* Provide support and environment for Panchayat Raj Institutions and NGOs to manage their own drinking water sources and systems in their villages.
* With regard to lakes, ponds, river, well water and underground water.
* Enable all rural people to have access to and use safe & adequate drinking water.
* Ensure portability, reliability, sustainability, convenience, equality and consumers preference.
* And conveniently accessible at all times and in all situations
* Needs on a sustainable basis. This basic requirement should meet water quality standards and be readily

V. MATERIALS AND CHEMICALS REQUIRED -

Sodium chlorite, 2 N sodium hydroxide, 2 N conc. HCL, 0.05N sodium sulphide, 30% v/v Hydrogen peroxide, He and Ne Cylinders, malachite green oxalate dye, acetone, Water Hyacinth, hen Feathers, coconut shell.

VI. EXPERIMENTAL PROCEDURE

The experiment work divides into Four parts: -

1.) Preparation and activation of coconut shell carbon

2.) Activation of hen feathers

3.) Preparation of bio plastic from Hen Rachis.

4.) Activation and cleaning of water hyacinth.

A.) Preparation and activation of coconut shell carbon

1.) Collected discarded coconut shell from nearest temple

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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 in the inert atmosphere of He and Ne, at 17 atm

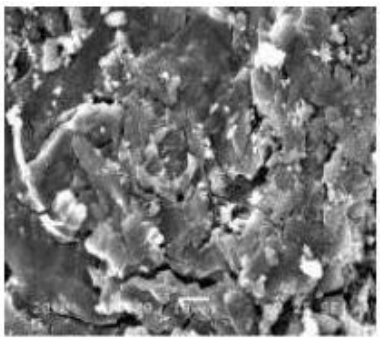
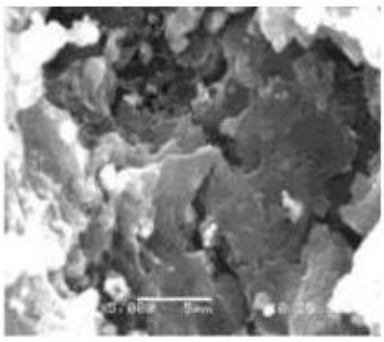
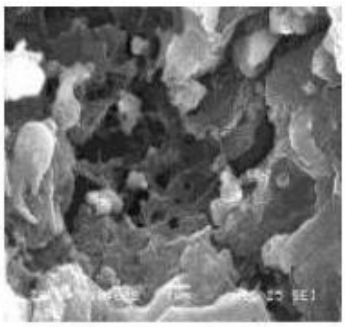
3.) Then the burnt material was crushed into small beads

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 degrees Celsius**.**

6.1 SEM Images of coconut shell carbon:-

6.2 Activation of Hen Feathers

1.) Collected the Hen Feathers from nearest slaughter shop. As shown in fig 1.

2.) Washed it with a tap and detergent water.
For removing blood stains, washed it with a sodium chlorite solution or ethyl alcohol fig 3.

3.) Then for remove sticky impurities, Soaked the Hen Feathers in 30%v/v solution of hydrogen peroxide for 24 hrs. See fig 3.

4.) Then again washed it with distilled water.

5.) For removing excess water, treated hen

6.) Feathers undergone to a Buchner funnel process. Fig 6.

7.) Finally kept the Hen Feathers in oven at 100 degrees Celsius for removing the moisture. Then separate the Hen barbs and hen rachis separately from treated hen feathers.

6.3 Preparation of Bio plastic from Hen feathers

1.) Take treated Hen rachis in bulky amount. Fig 1.

2.) Add approx. 5 gm. of Hen Rachis powder in 100 ml of 0.05N sodium sulphide and 2 N NaOH solution

3.) Stir this mixture on magnetic stirrer at 32 degrees Celsius for 2 Hrs. step 1.
The solution is then filtered and centrifuge at 18000 rpm for 5 min. step 2.

4.) The supernatant liquid collected by using filter paper. Then 2N HCL was added to the soln. step 3.

5.) Pour the precipitate mixture onto a Petri dish and then leave it to dry out at 50degree Celsius for an Hour to make plastic, step 4.

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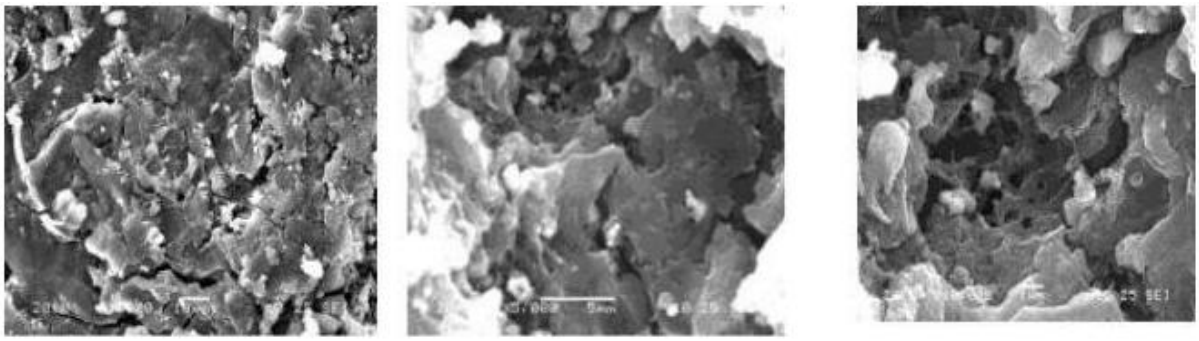
6.4 SEM of Hen Feathers



VII. ACTIVATION AND CLEANING OF WATER HYACINTH:-

1.) Collection of water hyacinth from nearest Indrayani River.

2.) Cleaning with ethyl alcohol, soaked in 20% H_2O_2 for 24 hr.

3.) Drying in Infrared light and make it powder form

4.) And then stacked in bio plastic system.

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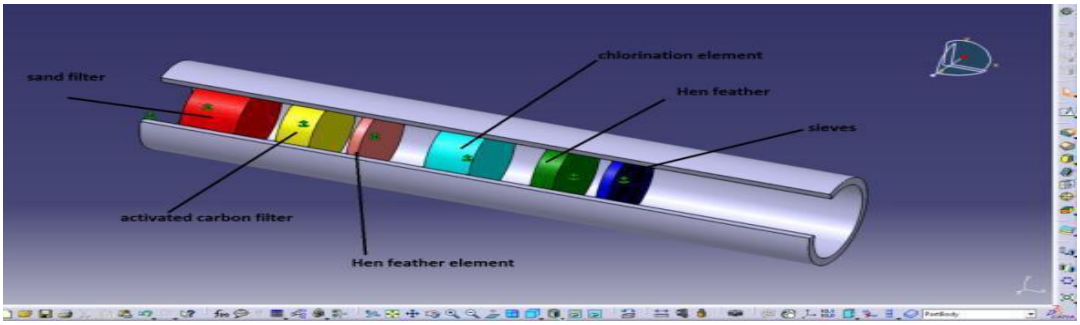
7.1 Prototype



VIII. ADVANTAGES OF BIO PLASTIC STRAW

- Totally eco-friendly.
- High tensile strength. Economical.
- Can be used for purification of water.
- Amount of raw material can be obtained from any nearest slaughter shops.
- We can make Polybags, toys, fibres, etc. from it.

IX. METHODOLOGY

A stock solution of malachite green oxalate having concentration of 1*10^-5 was prepared by dissolving 0.0927 gm of malachite grenn oxalate crystals to the final volume of 250 ml in distilled water

From the stock solution further dilute solution of various concentrations, mentioned in the table below, were prepared from the adsorption study.

Desired concentration	Amt of Stock soln (ml)	Distilled water (ml)
1*10^-5	2.5	250
2*10^-5	5	250
3*10^-5	7.5	250
4*10^-5	10	250
5*10^-5	12.5	250

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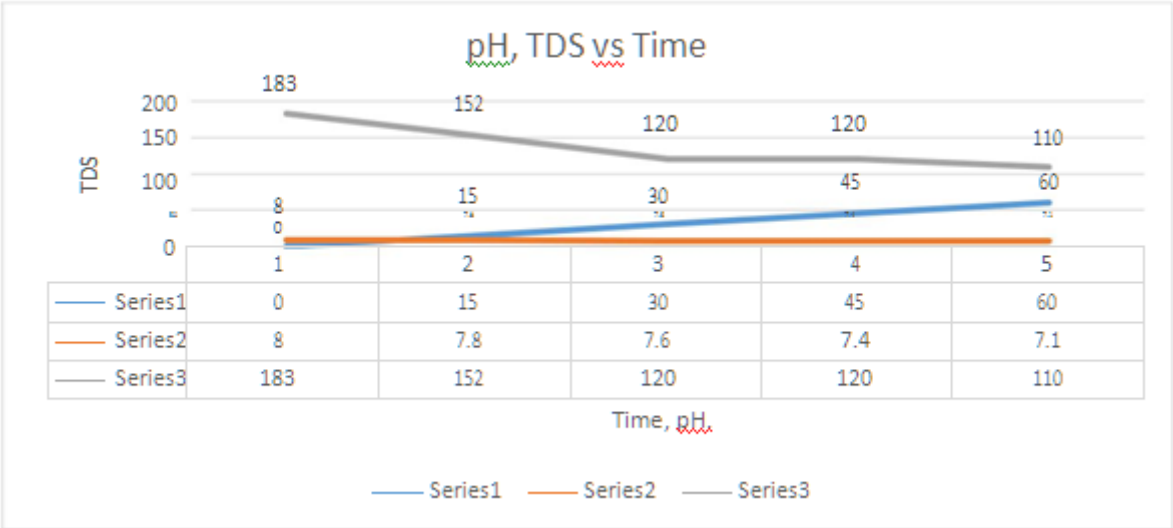
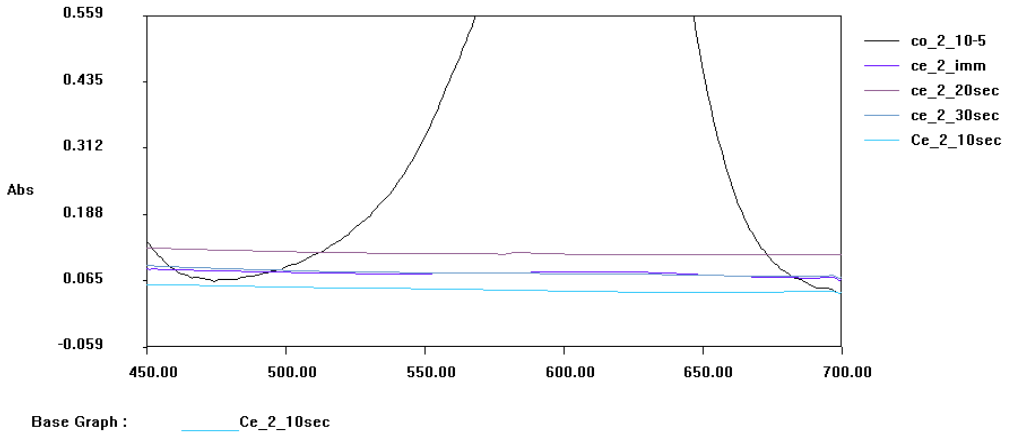
X. RESULT

Analysis	Before Sampling	After Sampling
PH	8.2	7.2
TDS	183 ppm	110 ppm
Hardness	289 mg/L	62 mg/L
BOD	4	2



	1	2	3	4	5
Series1	0	15	30	45	60
Series2	8	7.8	7.6	7.4	7.1
Series3	183	152	120	120	110

Graphs: -The UV-Vis Spectrum shows the effective removal of malachite green oxalate at different contact timing of the Activated Charcoal with water sample.



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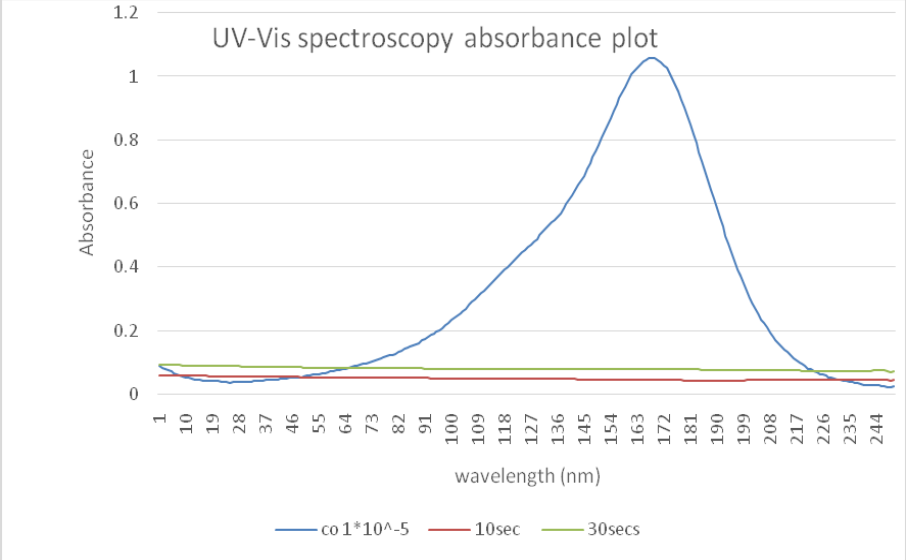

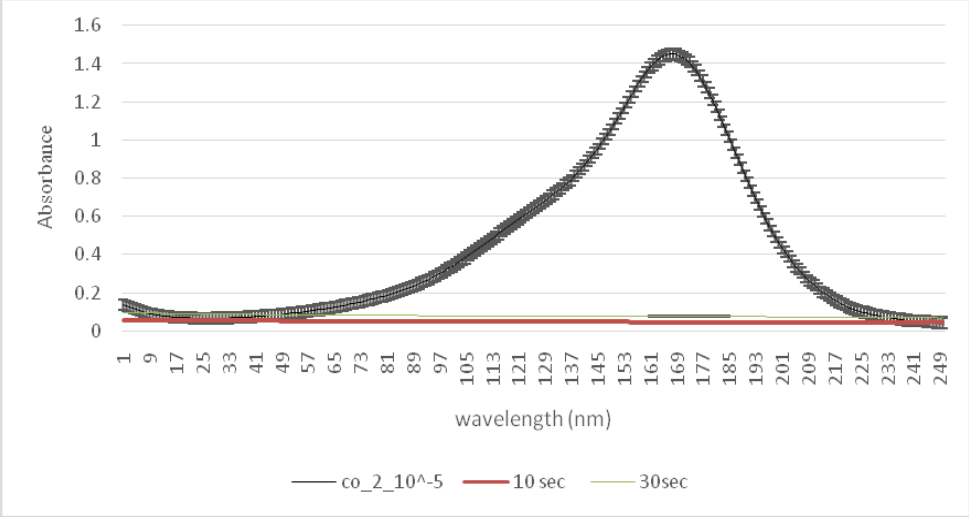

XI. ACKNOWLEDGEMENT

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2.) Prof Amravati Gode from MIT-AOE, Pune

3.) Colleague, Sukalp Lamture from MIT-AOE, Pune

4.) Physics Department of Pune university, Pune

5.) Microbiological department of DY Patil collage of Arts, Science and commerce, Pune.

XII. CONCLUSION

We took water sample from Indrayani river (flowing at backside of our collage), Analysed it at different varying parameters and found absorption of malachite green dyes on activated charcoal on immediately contact and we also sussed to decrease PH, TDS, Hardness, and BOD at very desired level.

IJARSE
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Hence, we can conclude that we are ready to provide this prototype at doorsteps of each common people at the rate of approx. 5-6 rs, eco-friendly way, and this can be used up to 6-7 days. This system can filter 500-ltr water in one time use, yet now its use and throw model.

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