

# Rapid Sand Filter Using Coconut Shell

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**Abstract:** *The increasing demand for cost-effective and sustainable water treatment solutions has led to the exploration of alternative filtration media. This study investigates the performance of a rapid sand filter enhanced with coconut shell as a capping material. Coconut shells, when processed into granular or activated carbon form, offer high surface area, excellent adsorption capacity, and biodegradability, making them a viable substitute for conventional filter media. Experimental trials were conducted to evaluate parameters such as turbidity removal, filtration rate, and head loss. Results indicate that the coconut shell layer significantly improves the removal efficiency of suspended solids and organic impurities while maintaining optimal flow rates. The use of coconut shell not only reduces operational costs but also promotes the utilization of agricultural waste, contributing to environmental sustainability. This approach demonstrates strong potential for application in rural and urban water treatment systems..*

**Keywords:** Rapid Sand Filter, Dual Media Filter, Coconut Shell Capping, Crushed Coconut Shell, Water Filtration, Turbidity Removal, Total Solids, Reduction, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), pH Adjustment, Economical Filtration Media, Sustainable Water Treatment, Alternative Filter Media, Drinking Water Purification, Eco-friendly Filtration

## I. INTRODUCTION

Filtration is a process that is widely used for removing fine particles from water. Almost all conventional Surface water treatment facilities and some Ground water treatment facilities make use of Rapid Sand Filter. Rapid sand filter is commonly used in the treatment of surface water supplies. Some form of pretreatment of raw water, such as sedimentation, is usually needed. Most of the conventional water treatment plant are overloaded due to increase demand which highlights the need of higher filtration rate. Dual media and multimedia filters can overcome these of RSF alternatively higher filtration rates even can be achieved. However, the use of such techniques is limited in India due to unavailability of filter materials apart from sand..

## II. PROBLEM STATEMENT

Conventional rapid sand filters are widely used in water treatment plants for removing suspended solids and turbidity. However, they face several challenges such as:

## III. METHODOLOGY

The following procedure was adopted for conducting the test-

1. Filter layer consisting of gravel bed of 20 cm thickness, sand layer of 15 cm thickness and crushed coconut shell layer of 20 cm thick ness was spread in the filter unit.
2. The water obtained from the lake stored in a large container for a detention period of about 3-4 hours .The supernatant water after sedimentation process was passed through rapid sand filter.



3. Influent water is fed into the filter with the help of a dispenser of 20liters capacity has been placed well above the filter unit.
4. A head of water above the filter media in the filtration unit of 10 cm was maintained throughout the test period .the raw water was fed to filtration unit continuously through dispenser placed above the filtration unit.
5. Effluent sample were taken at a frequency of every 1 hours. These sample are tested for turbidity, pH, total solids, BOD.
6. The experimental has been carried out up to 8 hours. 7. The following procedures were adopted to test the water sample in the laboratory.

#### **IV. CONCLUSION**

1. Coconut shell when used as a filter media in the filtration process gives good efficiency.
2. There was considerable reduction in turbidity, total solid, pH and BOD.
3. There was considerable reduction in the color intensity.
4. The reduction in turbidity is up to 90%.
5. The Decrease in the total solids was upto 89%.
6. Reduction of BOD proves that organic compound can be efficiently removed by Coconut shell

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#### **REFERENCES**

- [1].Ansari Mubeshshera Awais,"Designing Rapid Sand Filter By Using Coconut Shell for a Village", 2017.
- [2]. Mota Manoj H,"Improvement of Performance of Rapid Sand Filter using Coconut Shell as Capping Media". International Journal of Science and Research, 2012.
- [3].Snehal N Chaudhari,"Modification in Rapid Sand Filter with Coconut Shell as Capping Media", International Journal for Technological Research in Engineering,2017.
- [4].Shilpa S Ratnoji,"A Study of Coconut Shell – Activated carbon for filtration and its comparison with sand filtration", International Journal of Renewable Energy and Environmental Engineering,2014. [5].Umesh M,"Use of Coconut Shell as Capping for Sand in Rapid Sand Filter", 2017. [6]P.M.A Odira, "Performance of Crushed coconut shell Dual media filter".2007

