

# Turbidity Removal from Water by Use of Different Additive Materials

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**Abstract**—Turbidity is a term which refers to how much the water is clear – the amount of greater total suspended solids in the water, the murkier or muddier it appears and which shows high turbidity value. Turbidity increases due to presence of suspended solids in the water that reduces the limit of transmission of light. Suspended solids are varied, ranging from clay, silt, to industrial sewage and wastes. The suspended solids found in the water can be preyed upon by viruses and bacterium. During the rainy season, rainstorm, particles coming from the surrounding areas are washed into the pond making the water a muddy brown color, indicating water that has higher turbidity content.. Different by-products can be used to make the water safe and free from turbidity. These Materials namely Rice-Husk, Fine Sand, Groundnut-Shell are very much effective in reducing the turbidity from water. These filter by-products can reduce the turbidity from water to about 65% or more.

**Keywords**— Turbidity, filtration, adsorbent.

## I. INTRODUCTION

### A. Method of Adsorption Process

Different patterns were conducted and followed to make a sequence to establish a reduction process of turbidity from water. In this study Carbonized Rice Husk and Activated Rice Husk experimental process was applied in this study firstly. Rice Husk capacity was found to be increased after the chemical treatment. Rice Husk (Treated Rice Husk) attracted greater attention than untreated once, as a result of comparatively higher adsorption capacity by high adsorption capacity, easy separation from aqueous solution. Rice husk is inexpensive and abundant material on earth and it can be used as the best adsorbent for the removal of various pollutants from water and waste water, Hmaruzzaman M., and Gupta V.K. [1]. The by-product with these properties with low cost, and recycling use are promising materials in the future. Procedure of characterization of active silica with a high specific surface area than the rice husk ash V.P. Della [2]. Relative amount of silica was increased after the burning of carbonaceous material at different times and at different temperatures. For the removal of different pollutants present in water Ground-nut shell has been used as a potential low-cost by-product material. To remove turbidity, Gravity Filter is one of the best technique, just by making layers of fine sand and gravels, by this process turbidity level can be reduced down to much extent without introducing any chemicals into it.

### B. Use of Rice Husk as an Adsorbent

During the milling process of Rice Grains, the outermost layer of paddy grain is said to be Rice Husk. This husk contains about 77 % organic volatile matter and the balance 23 % of the weight of this husk is converted into ash during the firing process, is known as rice husk ash (RHA). Rice husk was largely considered a waste product that was often burned or dumped on landfills. This husk is used as fuel in the rice mills to generate steam for the parboiling process In India, rice husk is used to supply to rural villages for cheap and

affordable electricity usage. These are been popularly used as a very effective filter media which helps the filtration of solid as well as liquid systems of colloids, fine, highly compactible particular solids. This RHA in turn contains around 85%-90% amorphous silica.



Fig. 1. Carbonized rice husk and rice husk.

### C. Use of Grinded Ground-Nut Shells as an Adsorbent

The work highlights efficient utilization of groundnut shell ash (GSA) for various applications. The production groundnut seeds average about 43,842 metric tons across the globe. Those seeds are used as a food material and for extraction of edible oil. The shells of groundnut seeds are waste, having a high calorific value so its potential is tapped in industries. GSA is a rich source of micro nutrients and improves yield, and is spread on agriculture lands as a soil additive. Groundnut shells are a rich source of fuel. Groundnut shells are also a very effective media in the filtration of turbid water. The Nano-meter size pores are very efficient in blocking dirty particles present in water.

## II. MATERIALS AND METHODS

### A. Methodology Adopted

Layout of Model:-

Firstly, Three 2 litre cylindrical bottle was taken having a hole at the end for the water from where water will come out.

At the bottom of the bottle, fine sand of 300 micron is placed till 0.3 height of the bottle after that fine gravels of 1.25 mm was placed over that and then 4.75mm gravels were placed on the top. Sieve analysis was done before layout of model. In between every layer, filter paper was kept so as to separate it from each other. 2.5 kg of Rice Husk is taken and washed with hot distilled water so as to remove the impurities from it. After that it is dried under sun to get a natural heat and good evaporation value. Rice Husk was allowed for good burning in Muffle furnace at temperature about 810 degree Celsius for time period of 3 hours. It was allowed to cool down and was taken out on the next day. From about 2.5 kg of Groundnuts almost 0.73 kg of groundnut shells was obtained, it was washed properly in distilled water and was allowed to be dried under sunlight. Thereafter the shells was Grinded as was ready to use for experimental process.

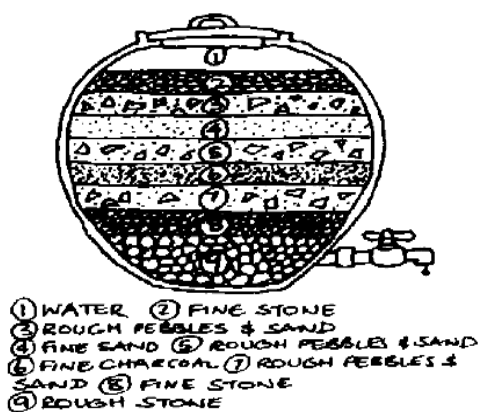


Fig. 2. Gravity sand filter with charcoal.

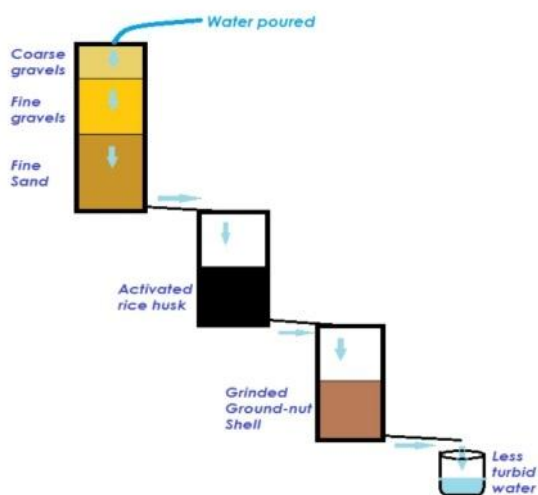


Fig. 3. Layout of experimental process.

a) *Experimental steps performed in the lab:-*  
**PART-I**

1. In first case we take three test samples of turbid water one by one and pour them in equal amount to each one of the setup one by one.

2. In the first test sample case of Gravity sand filter, the gravels and sand can remove a lot of organic matter and dirt present in water.
3. Due to layer of sand the coagulation particles present in water are removed easily.
4. Now the use of Activated rice husk is due to its property that it is very is very porous and it has the ability to stop the coagulants effectively.
5. Similarly the sample similar one is poured in it and calculation result is observed
6. After all, the sample is passed through Grinded ground-nut shell.
7. After all the 3 steps, results are obtained and it is shown in tabulated form.

**PART-II**

1. Now in the second part, partially different procedure is applied.
2. Only one sample of the turbid water is first taken into consideration.
3. First the water sample is passed through the Gravity Filter then to the Activated Rice Husk and the at last to the Grinded Groundnut Shell.
4. Then the results are calculated

**III. RESULTS AND DISCUSSION**

TABLE I. Observed value.

Parameters	Units	After passing Through Activated Rice Husk	After passing Through Activated Rice Husk	After passing Through Grinding Groundnut Shell
pH	-	6.94	6.94	6.97
Hardness	mg/l	93	87	82
Individually Passing the water (Turbidity)	NTU	(Initial Turbidity- 81.4) After passing- 21.4	59.6	19.1
Passing One After Another (Turbidity)	NTU	(Initial Turbidity- 81.4) After Passing- 21.4	52.8	18.8

**IV. CONCLUSION**

In this Study it shows that the created filter has shown good results regarding water purification process. After going through the results it gave that rice husk before using should be treated as it contains lot of impurities and dust particles and also we find it releases color pigment when it gets in smaller forms. But however the result was far better with the untreated Rice Husk with greater optimum efficiency. Moreover, the possible use of primary materials, which considered residuals and wastes in the agricultural industry, possesses implications of interest as much economic as environmental since it is already evident that its appropriate use will benefit the sustainability and the process of environmental conservation. The gravity filter and Grinded Groundnut shell filter also has very much potential as it can remove turbidity to a greater extent.

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